The Welding Engineer

Founded by L. B. Mackenzie, 1916

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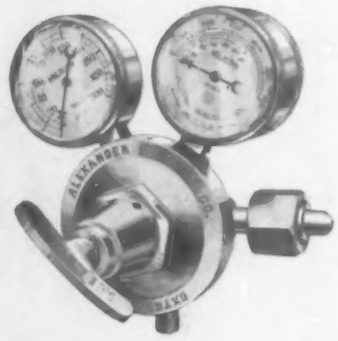
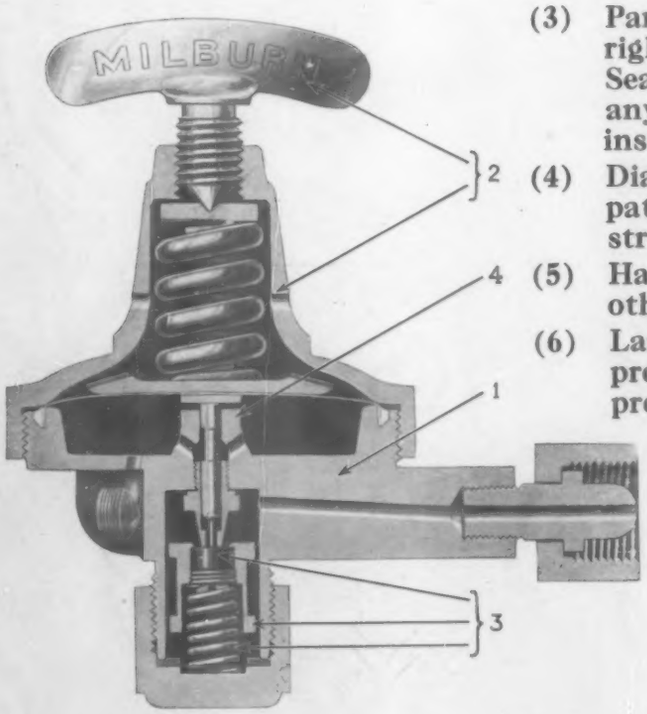
$3.00 per year in U. S. — 608 S. Dearborn St., Chicago, Ill. — Reg. U. S. Pat. Office — $4.00 per year abroad



Why this regulator has established a new standard



(1) Solid bronze forging — bridge-like construction. Cannot crush in.

(2) All parts forged bronze — tensile strength, 60,000 lbs. per square inch —make permanent, non-stripping threads.

(3) Parts telescopic, covered by patent rights, giving perfectly aligned seat. Seat the most easily accessible of any regulator made — seats *with* instead of *against* the pressure.

(4) Diaphragm movement, limited by patented abutment, cannot be strained or inverted.

(5) Has fewer parts than regulators of other types.

(6) Large volume capacity and delivery pressure maintained as initial gas pressure diminishes — this is not attained in other regulators.

Other features greatly superior, can only be appreciated by actual comparison of Milburn with other regulators.

Write for Bulletin 200A

THE ALEXANDER MILBURN COMPANY
BALTIMORE, MD.
ESTABLISHED 1907
Manufacturers of the World's Best Welding and Cutting Equipment

Published monthly by the Welding Engineer Publishing Co. Entered as second class matter Jan. 20, 1916, at the Post Office at Chicago, Ill. Under the Act of March 3, 1879.

100,000 welders

KNOW Oxweld blowpipes. Most of them learned their trade with Oxweld's old reliable W1 welding blowpipe.

More than that, every operator knows that Oxweld has placed its facilities at his disposal to advance him in his trade. For Oxweld realizes that if the industry is to progress the operator must be encouraged to advance.

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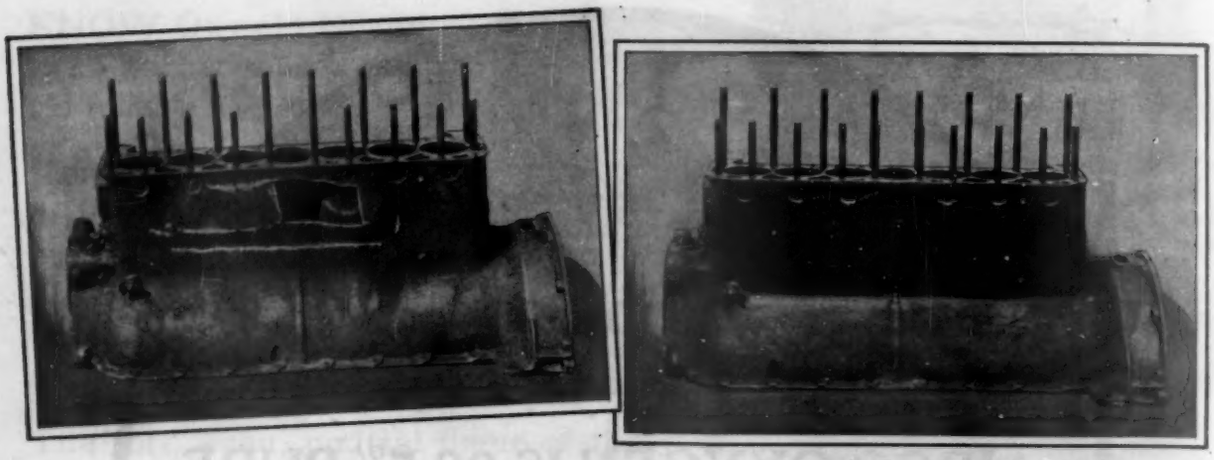

This illustration shows the water jacket welded and painted—as good as new.

Here is a job typical of the class of work being done on cast iron with the aid of TOBIN BRONZE Welding Rods.

Actual time on job—three hours. Material used —one lb. of ⅛" Tobin Bronze Welding Rod and 30 cubic feet each of Oxygen and Acetylene.

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Tobin Bronze Rods, manufactured solely by The American Brass Company, can be secured from leading Distributors.

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TOBIN BRONZE
REG. U.S. PAT. OFF.
WELDING RODS

The Welding Engineer

Founded by L. B. Mackenzie, 1916 — Reg. U. S. Pat. Office

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What Columbus Discovered

WHEN Columbus came to the end of his Western trip he discovered something that amounted to far more than additional real estate. He discovered a new land rich in natural resources and rich in opportunities. As time passes the opportunities multiply. Columbus would have been glad to ride back to Spain on one of our modern liners which makes the trip in eight or ten days. He also would be amazed to see the men of this nation today putting ships together and taking them apart by means of the gas torch and the electric arc. In fact the advertising pages of The Welding Engineer are full of conveniences and economies which were unknown even twenty-five years ago. A careful reading of them gives you a story of progress and a story of greater possibilities for you. You can well afford the time it takes to get acquainted with these progressive manufacturers and obtain from them copies of valuable booklets which they are distributing upon request. Your first trip through these advertising pages will be a veritable voyage of discovery.

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Last Advertising forms close at 8:00 a. m. on the 12th. To show proof for correction copy must be received at an earlier date and allowances should be made for delay to mails. All copy should be in by the 12th of the month at the latest.

The Welding Engineer does not publish in its news or advertising columns any matter that deals with or refers to either personal or legal controversies.

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SOUTH AFRICA—J. W. Arnison, 35a Victoria Ave., Benoni, Transvaal, South Africa.

Buyers' Index

Readers of The Welding Engineer will find this index to contain the most accurate information obtainable relating to welding apparatus and supplies. The advertising section includes the principal manufacturers of the United States.

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Air Reduction Sales Co.
Commercial Acetylene Supply Co.
International Oxygen Co.
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BLOW PIPES
See "Torches."

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Purox Co.
Torchweld Equipment Co.
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Lincoln Electric Co.
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Westinghouse Elec. & Mfg. Co.
Wilson Welder & Metals Co.

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See "Cutting Electrodes"

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Steel Sales Corp.
Seneca Wire & Mfg. Co.
Stoody Co.
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Griesheim
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Phillips-Laffitte Co.
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Ideal Face Shield Co.
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M. Keith Dunham
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U. S. Welding Co.

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Willson Goggles, Inc.

GRAPHITE (Rods, Blocks, Paste, Etc.)
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GRINDERS (Portable Electric)
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Wodack Electric Tool Corp.

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Allan Mfg. & Welding Co.
Electric Arc Cutting & Welding Co.
Fibre-Metal Products Co.
General Electric Co.
C. H. Hollup Corp.
Ideal Face Shield Co.
Indianapolis Switch and Frog Co.
Lincoln Electric Co.
Safety Equipment Service Co.
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Welding Service Co.
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HYDROGEN
Gas Products Association
International Oxygen Co.

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International Oxygen Co.

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Rugged—Simple

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Milburn, Alexander, Co.
Oxweld Acetylene Co.
Purox Co.
Torchweld Equipment Co.
United States Welding Co.

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Gas Products Association
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Milburn, Alexander, Co.
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Purox Co.
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Welding Service Co.
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International Oxygen Co.

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The Welding Engineer 608 S. Dearborn St., Chicago

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Des Moines....Third and Elm Sts.
Dubuque....8th and Washington Sts.
Fort Dodge....Central Ave. at 16th St.
Ottumwa....207-9-11 S. Washington St.
Sioux City....410 Court St., P. O. Box 596
Waterloo....1209 E. Fourth St.

KANSAS
Pittsburgh....1201 North Broadway
Salina....154 N. Fifth St.
Wichita....600 W. Douglas Ave., P. O. Box 951

KENTUCKY
Lexington....Third St. and Walton Ave.
Louisville....Brook and Main Sts.
Middlesboro....1701 Cumberland Ave.

LOUISIANA
Monroe....219 Walnut St.
New Orleans....119 N. Front St.
Shreveport....615 Market St., P. O. Box 62

MAINE
Portland....42 Commercial St.

MARYLAND
Baltimore....19 E. Lombard St.
Cumberland....P. O. Box 172, 18 N. George St.
Salisbury....Cor. Mill and Right St.

MASSACHUSETTS
Cambridge....539 Concord Ave.
Indian Orchard....Pasco Road
Worcester....342 Canterbury St.

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Detroit....5785 Hamilton Ave.
Grand Rapids....560 Shawmut Ave., N. W.
Iron Mountain....513 Stephenson Ave.
Iron River....321 Carnegie Ave., P. O. Box 257
Ironwood....
Ishpeming....511 E. Vine St.
Jackson....518 S. Water St.
Lansing....617 E. Shiawassee St.
Muskegon....301 W. Western Ave.
Saginaw....1830-1840 N. Michigan Ave.
Sault Ste. Marie....

MINNESOTA
Minneapolis....334 N. First St.
Virginia....413 Chestnut St.

MISSISSIPPI
Vicksburg....1701-03 Levee St., P. O. Box 322

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Kansas City....1422 St. Louis Ave.
St. Joseph....920 S. Sixth St., Station A
St. Louis....(See East St. Louis, Ill.)

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Omaha....1007-9-11 Jones St.

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Camden....Front and Division Sts.
Newark....251-255 Ridgewood Ave.

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Niagara Falls....
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Utica....135 Hotel St.
Watertown....438 Court St.
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Charlotte....205 W. First St., P. O. Box 777
Raleigh—P. O. Box 149, McCullough and Lenoir Sts.
Wilmington....612 Surry St.
Wilson....700 S. Goldsboro St.

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OHIO
Akron....97 East South St.
Athens....Corner Factory and Moore Sts.

Canton....618 Mulberry Road, S. E.
Cincinnati....67 Plum St.
Cleveland....1348 Hanna Bldg., Annex
Columbus....330 Dublin Ave.
Dayton....104-114 S. Wayne Ave.
Gallipolis....706 First Ave.
Lima....232 E. High St.
Mansfield....40 W. Third St.
Steubenville....324 N. Seventh St.
Toledo....414 S. Erie St.
Youngstown....Jones and Brittain Sts.
Zanesville....Cor. Main and 2nd Sts.

OKLAHOMA
McAlester....127 East Chickasaw St.
Oklahoma....4 West Park Place
Tulsa....1-11 N. Boulder St.

OREGON
Portland....15th and Hoyt Sts.

PENNSYLVANIA
Allentown....311 Gordon St.
Beaver....436 3rd St.
DuBois....Weber Ave. and Franklin St.
Erie....1502 Sassafras St.
Greensburg....Clark and George Sts.
Harrisburg....25 S. Tenth St.
Hazelton....223 East Mine St.
Johnstown....Messenger St. and B. & O. R. R.
Philadelphia....Delaware Ave. and Brown St.
Phillipsburg....P. O. Box 146, North Front St.
Pittsburgh....1202 Chamber of Commerce Bldg.
Pottsville....Railroad and Sanderson St.
Scranton....225 Vine St.
Shamokin....Fifth and Walnut Sts.
Sharon....Budd St. and South Irvine Ave.
Spangler....Bigler Ave.
Wilkes-Barre....150-156 E. Northampton St.
Williamsport....Canal and Court Sts.

SOUTH CAROLINA
Charleston....3 Liberty St.

SOUTH DAKOTA
Watertown....224 First Ave., N. W.

TENNESSEE
Chattanooga....600 E. 10th St.
Knoxville....430 West Depot Ave.
Memphis....671 S. Main St.
Nashville....102-104-106 Broadway

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Amarillo....P. O. Box 697, 101-105 Pierce St.
Beaumont..Santa Fe Bldg., 1118-28 Jackson St.
Dallas....Santa Fe Bldg., 1118-28 Jackson St.
El Paso....1601 Magoffin Ave.
Houston....812 Live Oak St.
San Antonio....115 S. Medina St.
Waco....315 S. Thirteenth St.
Wichita Falls....1507 Lamar St., P. O. Box 1002

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Salt Lake City....108 W. Second South St.

VIRGINIA
Lynchburg....1324 Commerce St.
Norfolk....120 W. Plume St.
Richmond....1709 East Cary St.

WEST VIRGINIA
Bluefield....195 Roanoke St.
Charleston....Broad St. and K. & M. R. R.
Clarksburg....608-612 North Third St.
Elkins....Railroad Ave. and First St.
Fairmont....Auburn St. and B. & O. R. R.
Huntington....Seventh Ave. and Elm St.
Morgantown....610 University Ave.
Mount Hope....P. O. Box 416
Mullens....P. O. Box 27
Wheeling....43rd and McCulloch Sts.
Williamson....Ft. of West 2nd St., Box 305

WASHINGTON
Seattle....364 Railroad Ave., S.
Spokane....162 S. Post St.

WISCONSIN
Appleton....909 N. Lawe St.
La Crosse....Front and King Sts.
Madison....513-19 Williamson St.
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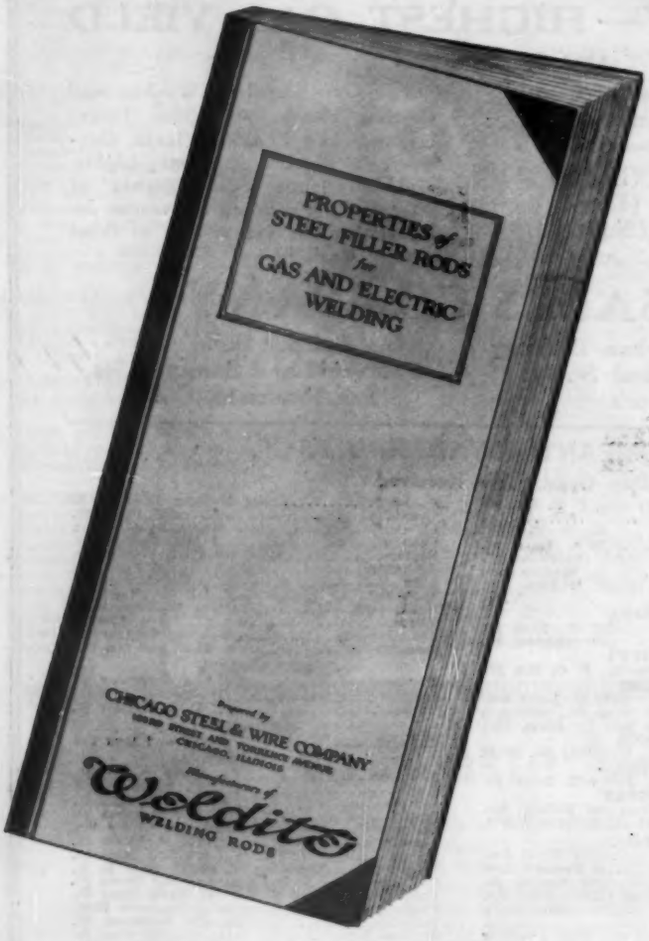
UNION CARBIDE IS EASILY OBTAINABLE EVERYWHERE

New Welding Rod Facts



This Booklet

Tells for the first time the scientific facts concerning Welding Rod. It answers in plain language literally hundreds of questions for the welder.

Do you know---

Why sulphur segregated to the center of a rod does no harm but if distributed throughout the rod causes poor welds?

That water under some conditions will ruin a welding rod?

Where gas gets into a welding rod and what its presence means to the welder?

How carbon and manganese affect an electrode?

What the real difference is between gas and electric rod?

Why some welding rod is no better than fence wire and some fence wire makes good welding rod?

Every user has at sometime had Filler Rod trouble which he did not understand. The answer is in this booklet.

Free for the asking

In addition to the text there is a Catalog Section

This describes the WELDITE Line of Iron or Steel Filler Rods. It includes five different grades of steel rod for gas welding and five for electric welding. These range from practically pure iron to the very highest carbon. It also includes a wonderful nickel steel and a special Chrome-Vanadium Rod for track work.

Ask to have your name on the list to receive all the bulletins published by the Research Department of the

Chicago Steel & Wire Co.

103rd Street & Torrence Avenue :: Chicago, Ill.

Here It Is!

The "G and G" New Style Regulator

PATENT PENDING

Safety First "G and G"

The Torch's Friend "G and G"

Four Reasons Why the "G and G" New Style Regulators Are Superior in Operation

I

The "G and G" **DESIGN** is the first departure from the ordinary style gas pressure regulators in over thirty years.

You will notice the diaphragm and valve are in separate compartments. This gives freedom of motion and a leverage control on the valve that is positive.

II

The "G and G" **VALVE** is so constructed that it cannot stick.

It is free and easy in action. Steady full flow—Accurate—Very sensitive.

III

The "G and G" **SAFETY FEATURE** is a revelation in itself. If diaphragm should burst or any part of regulator be severely damaged, the high pressure is automatically and instantly shut-off.

IV

The "G and G" **CLEAN OUT CHAMBER** is very simple. By removing cap it can easily be cleaned and the sieve replaced.

Manufactured by

The G and G Brass Manufacturing Company
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HIGH PURITY OXYGEN

High in Quality—

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Whatever your oxygen requirements may be, the plant nearest you will supply them quickly, economically and dependably.

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*Sacramento—California Compressed Gas Co.
*San Francisco — California Compressed Gas Co.
*San Jose — California Compressed Gas Co.
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COLORADO
Denver—Colorado Compressed Gas Co.

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Atlanta—Burdett Oxygen Co.

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Chicago—Acme Oxygen Co.
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INDIANA
*Evansville—Kentucky Oxygen-Hydrogen Co.
Indianapolis—Indiana Oxygen Co.
Logansport—Logansport Oxygen Co.
*South Bend—Burdett Oxygen-Hydrogen Co.

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Bettendorf—Bettendorf Oxygen-Hydrogen Co.

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Muskegon — Michigan Oxy-Hydric Co.

MINNESOTA
Minneapolis—Commercial Gas Co.

MISSOURI
Kansas City—Kansas City Oxygen Gas Co.
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*Trenton — Paschall Oxygen Company
*Trenton—International Oxygen Co.

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*Brooklyn—International Oxygen Co.
*Long Island — International Oxygen Co.
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Columbus—Gas Products Co.
Dayton — Dayton Oxygen & Hydrogen Products Co.
Niles—Ohio Oxygen Co.
Toledo—International Oxygen Co.
Wickliffe — Clarke Chemical Co.

OKLAHOMA
Oklahoma City—Burdett Oxygen Co. of Oklahoma City.

OREGON
Portland—Portland Oxygen & Hydrogen Co.

PENNSYLVANIA
*Allentown—Paschall Oxygen Company.
*Lancaster—Paschall Oxygen Co.
*Philadelphia—Burdett Oxygen Co.
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*Knoxville—Kentucky Oxygen-Hydrogen Co.
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*Nashville—Kentucky Oxygen-Hydrogen Co.

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Ft. Worth — Burdett Oxygen Co. of Texas.
*Galveston—Gregory Auto Supply Co.
Houston—Magnolia Gas Products Co.
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*Waco—Burdett Oxygen Co. of Texas.
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South Washington — Southern Oxygen Co.

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Seattle — Washington Compressed Gas Co.
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*Green Bay—Universal Oxygen Co.
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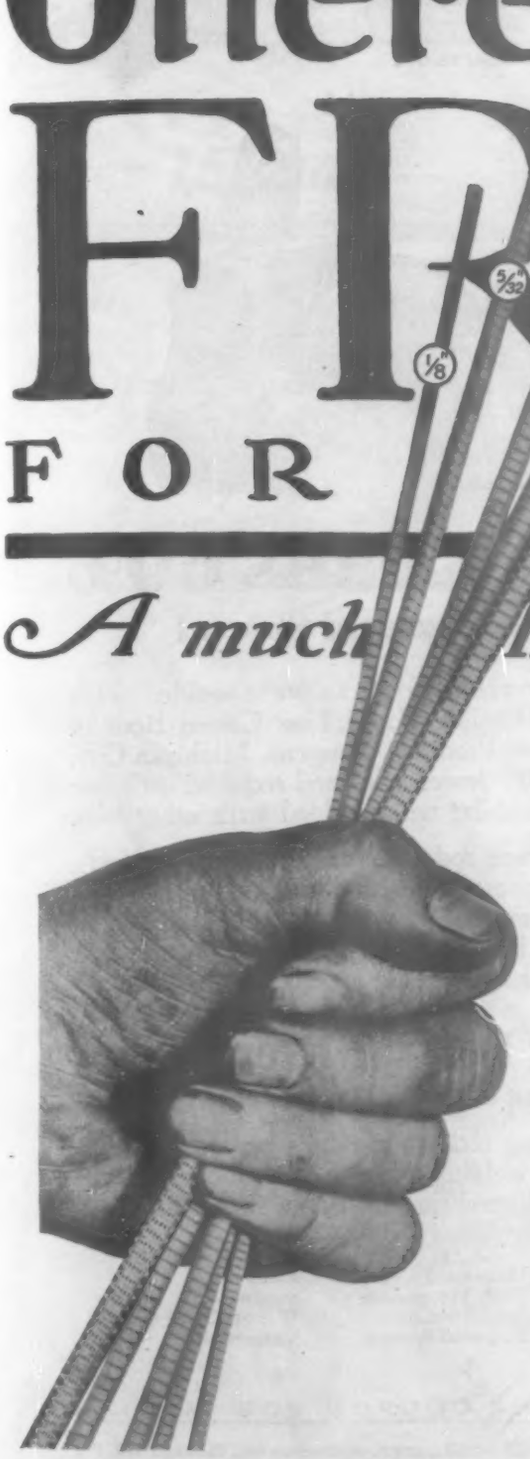
Gas Products Association

First to Advocate High Purity Oxygen

Offered to you FREE FOR TRIAL

A much Improved Welding Rod



OFFERED FREE FOR TRIAL

Gentlemen, we've GOT something and we want you to give it a trial.

It's the best and fastest welding rod on the market today. Called the Koro.

Its big patented feature is the series of corrugations which crystalizes the metal and sets up little resistance centers throughout the rod. Result: there's a lag developed in the current, which causes the metal to drop off in a steady stream of PELLETS: keeps metal from spattering; maintains a quiet arc; speeds up the work.

The COATING on Koro rods is another feature: it will stand very rough handling without flaking off and, being a mineral substance, it acts as a conductor of electricity, saving much power at the start and afterwards.

Types of Koro rods can be supplied to meet practically any requirements. They are reasonably priced.

Judging from the results obtained with them in big plants under actual conditions of service during the past year, you'd be glad to know more about Koros.

Use the coupon you find below to tell us what size rod you use, and we'll send you, free, a generous bundle of samples. Give Koro a trial.

KORO

ELECTRIC CORPORATION

229 W. ILLINOIS ST. · · · CHICAGO

And Here's a Better Holder

We manufacture also a patented, improved holder. Has big jaws that grip the electrode firmly, assuring constant contact—no short arc, no heating up. Holder is light and well balanced —operators like to work with them. Price is low. Send for picture and complete details.

KORO ELECT. CORP., Chicago, Illinois.
Gentlemen:
Please send samples (size.....) of rods you make, best suited to the following class of work:
☐ Send me price and further information on the KORO HOLDER.
Yours very truly,

Firm .....
Address .....
City ..... **State** .....
Individual .....

The Welder's Guide

In Using Elecweld Special

The "Sound of the Arc" test is a valuable test which can be applied to a weld without the use of mechanical apparatus.

Under a normal degree of current strength, a slow irregular snapping sound denotes a long arc or a poor flowing rod, both undesirable. However, a longer arc is required when using a poor flowing rod as the rod flows in larger globules, requiring greater clearance, and produces a hissing sound developed only as the globule forms at the end of the rod before passing through the arc.

The combination of a very short arc and a poor electrode has a tendency to produce sticking because there is not sufficient space for the large globule to to pass through the arc.

A uniform rapid fire-cracking or clicking sound denotes a good flowing quality and proper length of arc.

Try ELECWELD SPECIAL and note the result

A Practical Book on Welding
Send for Your Copy

Enlarged Section

Reduce Leaks 60%

By Using Elecweld Special

THE ABOVE compression tanks were welded with Elecweld special, Medium Hard, Flux Coated Rods in the plant of Sheet Steel Products Company, Michigan City, Indiana. They had 60% fewer leaks and required 40% less inspection time than similar tanks welded with other rods.

Elecweld Special, a bare rod (flux coated when specified), very low in carbon, phosphorous and sulphur, contains no gas forming impurities to cause pockets and pinholes, is unusually uniform in its flow through the arc and produces a smooth, clean, close grained weld.

A Welding Rod for Every Job

In Acetylene and Electric Welding

Large stocks of welding rods—a rod for every job in both acetylene and electric welding—are carried in our Chicago Warehouse for immediate shipment. A few important kinds are listed below.

Norweld Special	Hicarweld	Elecweld
Norweld	High Manganese	Steelweld
Castweld	Nickelweld	Wilson Color-tipt
Bronzeweld	Elecweld Special	Vanadweld

STEEL SALES CORPORATION

129 South Jefferson Street
CHICAGO, ILL.

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Steel, Monel Metal, Nickel, Brass, Copper, Copperweld, Nickel Silver, Phosphor Bronze, Wire Rope.

MAIL THE COUPON FOR SAMPLES

STEEL SALES CORP., 129 S. Jefferson St., Chicago WE-F

Gentlemen: Please send us samples of the following rods:—

I do— ☐ Elec. ☐ A. C. ☐ D. C. ☐ Acetylene Welding.

Firm .....

Street .....

City ..... *State* .....

LINCOLN HONOR ROLL OPERATORS

After 15 years—

Mr. Johnson says:

"I like the Lincoln machine best for its good service, for its smoothness of arc, and its "Stable-Arc control which makes it easy to maintain the arc."

See letter below

High Bridge, N. J.
Jan. 8, 1926,

The Lincoln Electric company,
Cleveland Ohio,

Kind Sir,

I first used a — Electric Welder in January 1908, and in June 1910 the Lincoln Machine was installed, and I have used it steady ever since. (15 years) Now I am foreman over six Lincoln Machines which are operated day and night at the Taylor Wharton Iron and Steel Company at High Bridge, N. J. I like the Lincoln Machine best for its good service, for its smoothness of arc and its "stable-arc" control, which makes it easy to maintain the arc.

Yours very truly,
Whitfield Johnson.
High Bridge, N. J.

The Lincoln Electric Co., Cleveland, Ohio

A carload every other working day

EVERY other working day a carload of new cylinders is shipped from Prest-O-Lite's own cylinder factory in Indianapolis. That is one of the reasons why you can always have an ample supply of dissolved acetylene for welding and cutting if you buy from Prest-O-Lite.

THE PREST-O-LITE COMPANY, INC.
Oxy-Acetylene Division

General Offices: Carbide and Carbon Bldg., 30 East 42d St., New York

In Canada: Prest-O-Lite Co. of Canada, Limited, Toronto

31 Plants—85 Warehouses
22 District Sales Offices

Prest-O-Lite
DISSOLVED ACETYLENE

EDITORIAL

Why Have Any Hole in the Doughnut?

REFERRING to the ancient definition of a pessimist as a man who sees only the hole in the doughnut, it has been noticed recently that some industrial celebrities are trying to punch a hole in the 1926 doughnut by predicting that although the first half of this year promises to be a prosperous one, there will probably be a noticeable reverse during the last six months. Granting that it is impossible to predict with certainty that the present condition of prosperity will prevail throughout the year, there is even then little excuse for putting the brakes on our mental attitude while we are going up hill. Sane and conservative business policies should always be followed, even when prosperity is at the peak, so that there will be something in reserve for the low periods, which will make it possible to continue on a profit making basis. It seems, however, that to deliberately create the belief that business is going to be poor at a definite time is likely to do more harm than good, by speeding the approach of a less prosperous period and perhaps making it worse than it would have been if industries as a whole insisted upon carrying themselves through such a period by force of determination and optimism. It is just about a year ago that some financial men asked us what would be the effect on the welding industry of the business slump which was due in the Fall of 1925. We told them that the welding industry was not interested in slumps, that the leaders in this industry were developing their processes and their products with the idea of getting more business than ever; and we believe that we were right, because the Fall of 1925 has come and gone without any noticeable slowing up in the expansion of this industry. Right now nearly all the manufacturers we know have their eyes on new fields which mean possibilities for more new business. As long as the industry continues to look forward in this constructive manner we doubt if any amount of theorizing about future depression will find support in this field.

Opportunity

CONTACT with the excellent work done by the welding department of the Denver Opportunity School has brought about an acquaintance with an educational institution which seems to be in a class by itself. Here is a school where boys and girls, and also men and women of any age, are admitted without examination to take as much instruction as they desire in any branch of work and at whatever time they can arrange to attend the school. All this is without charge. The absolute freedom from cost or restriction might seem at first to be a discouraging factor because it is so generally understood that humanity does not appreciate things which are given free. Fortunately, however, the instructors of this particular school, in the past, instilled into the minds of students the thought that in coming to the school they are giving value received in the form of time, attention and effort. Then, experience has taught these students that their return on the investment is a matter of earning power. Under the careful guidance of the administrators of the school and with co-operation of local industries, the school has gained quite a reputation for being a real help to anyone who is willing to put time, attention and study against the possibility of a better livelihood. Opportunity is the correct name for it. The working people are learning what it means and as a result the opportunity is in still greater demand. An addition to the school, which is now under way, will make it possible to accommodate at least three thousand more pupils daily. But we do not think Denver has a monopoly on opportunity. There is plenty of evidence that there is opportunity everywhere in the welding industry, for example. It is perfectly good even though the label may be printed in smaller type.

Dividends from Comfort

ONE of the first lessons learned by welders was that of the necessity for protecting the eyes by means of goggles or helmets. Welders probably do not fully realize that these protective devices not only keep them from injury but also increase their earning power by providing against discomfort. It is necessary to be comfortable on the job in order to work to the best advantage, and a few cents spent for this purpose will pay big dividends in aditional production. There are two kinds of welding which may prove to be uncomfortable jobs if the operator does not make a little provision for the special kind of work he is doing. One of these is welding on galvanized metal and the other is brazing. Possibly welders do not realize that the disagreeable effects of zinc fumes can be avoided either by adequate ventilation or by the use of a respirator which costs only a couple of dollars, and that throat irritation, which sometimes accompanies a great volume of brazing, can be entirely counteracted by using a certain brand of cough drops which cost almost nothing. Usually shop managers are more than willing to stand the expense of these special provisions, in order to have their workmen comfortable, but the welder himself is not going to lose any money by investing in the small items which enable him to turn out more and better work. Only a short time ago in fact, a welder told us that he was making a good deal better salary than the rest of the men in his plant because he supplied himself with a good grade of welding goggles instead of depending on a cheaper article which was supplied by his employer.

New Theories Change Equipment Designs

CAST iron cutting is becoming generally accepted as a standard operation, and many interesting stories are related to show the great variety of jobs on which the process can be expected to make large savings. It is doubtful if it will be developed sufficiently to rival steel cutting in efficiency, but numerous improvements have been made in technique since it was first declared to be practicable. Now there comes word from France that engineers have been able to make straighter, cleaner and narrower cuts and do away with the oscillating movement of the torch tip through the design of a special cast iron cutting torch. The new torch is unique in that it furnishes a jet of acetylene along with the cutting jet of oxygen. A torch constructed on this principle has already been in service and given satisfactory results. This may or may not be the last word in the solution of the cast iron cutting problem. It is enough, however, to indicate that future years may witness some interesting changes in the design of all equipment and that the difficulties encountered today have a good chance to be overcome if research and experimentation continue.

Why buy Linde Oxygen?

THAT'S a fair question. It deserves an answer. And there must be some good answers or Linde would not dominate the oxygen field.

Of course there is no better oxygen on the market. The name Linde has always stood for a uniform product of highest purity, for dependable supply and for prompt delivery. But these are only three reasons for Linde's leadership.

Linde service goes much deeper than that. A competent staff of field service men operating out of each district office stand ready to give you practical help and engineering advice. Our research laboratories are constantly making available through this service new applications and perfected methods of the oxy-acetylene process.

The newest additions to Linde service are Procedure Controls. They are detailed, carefully prepared instructions that enable an organization to carry out even difficult welding operations practically unaided.

To construct a welded storage tank successfully requires much more than skilled workmanship, although this is highly essential. Sound metal, efficient equipment, proper design and preparation of the joints, intelligent inspection and adequate testing all play an important part. The Linde Procedure Control on welding a storage tank gives detailed information on all necessary points.

THE LINDE AIR PRODUCTS COMPANY
General Offices:
Carbide and Carbon Building, 30 East 42d Street, New York
37 PLANTS—95 WAREHOUSES

Welding Pile Driving Ram Heads

Gas Welded Article Stands Up Through Service Which Wrecks Iron Castings Formerly Used

TWENTY-FIVE HUNDRED blows averaging from 5 to 50 tons each, wallop the welded pile driving ram head every day. That is the treatment which 10 welded pile driving ram heads have withstood continuously for the past five months.

Welded pile driving ram heads represent a comparatively recent achievement of the welding industry. It was brought about in the following manner: A construction company shipped a pile driving outfit from Detroit to Chicago for work here. When the machinery was assembled it was found that there were no ram heads. This was a misfortune for without them it was impossible to drive the poles. The terrific blow delivered by the 1000 pound hammer would merely shatter the poles instead of driving them into the ground. The ram heads, which had been left in Detroit, were cast iron. In fact, such heads are in common use most everywhere, and until five months ago, as far as we know, no others had been used.

Showing Heavy Weld On Under Side of Center Plate in All Welded Pile Driving Ram Head

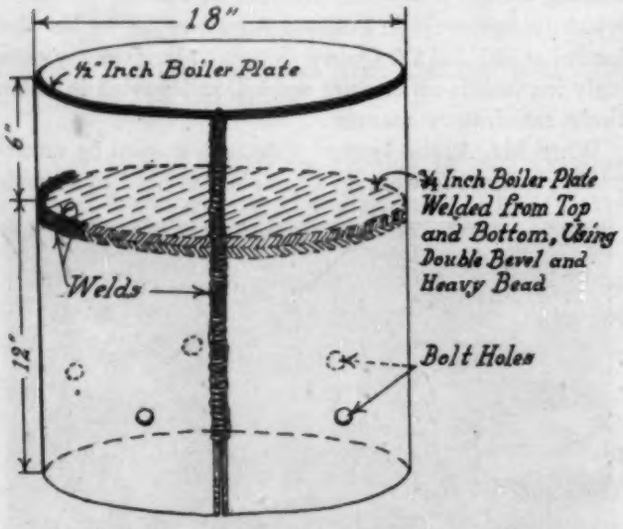
It, of course, was absolutely imperative that ram heads be procured, and fortunately for the welding industry there were none available on such short notice. Finally, after going from one place to another about the city, the construction company official was referred to Mr. R. W. Austin. Mr. Austin has been actively engaged in the welding industry for over eighteen years, the last ten of which he has spent in business for himself. In his plant located at 551-553 W. Quincy Street, Chicago, many seemingly impossible articles are welded, and welded in an entirely satisfactory manner.

When Mr. Austin learned what was wanted he unhesitatingly offered to weld up a sample ram head to meet the dimensions of the poles they were going to drive. The first ram head he made was 18 inches in diameter and 18 inches long. The cylindrical part of the ram head was formed and welded with one longitudinal weld. It was made up of ½-inch boiler plate. Twelve inches from one end of the cylinder a circular piece of ¾-inch boiler plate was welded in. This was welded from the top and then from the bottom as shown in the diagram. In this way a very secure and strong joint was made, so strong it could not be broken by the terrific blows of the pile driver. In the base of the head five holes were burned or cut at regular intervals. These were large enough so that good sized screw bolts could be inserted through them and screwed into the top of the pole. This was done to hold the cap securely on so that the vibrations, after the blow, would not bounce it off.

Showing Longitudinal Weld and Heavy Circular Weld on Top of Center Plate

On the top of the pile driver ram head is inserted a stick of wood of the same dimensions as the pile and from 3 to 5 feet long. The pile driver hammer hits on top of this piece of wood instead of directly on the ram head.

It is readily seen that the welded ram head must stand a terrific amount of abuse, for the ¾-inch circular piece of boiler plate receives the entire force of the hammer blow.



Construction Details of All Welded Pile Driving Ram Head

That means that the welding must be absolutely perfect and tremendously strong or there would be failure.

The company tested one of these pile driving ram heads for two weeks and at the end of two weeks' time it showed absolutely no sign of failure, and in fact, was just as good as the day it left the Austin Welding Works. Being thoroughly convinced of the value of welding for this type of work the contractor immediately placed his order for four more welded ram heads. Since that time Mr. Austin has turned out ten all welded ram heads which have been in continuous service. Up to the present time not one has reported any sign of failure. Nor has it been necessary to do any repair work on them. Mr. Austin says, "I have not seen one of them since they left this shop."

In order to get some idea of the terrific working conditions under which all welded ram heads must stand up and give satisfactory service, one must only consider the type of work they are doing. It takes on an average between 150 to 200 blows to drive a 40 foot pole into the earth under average earth conditions. Of course, when rocky earth conditions are met, it takes a great many more blows to drive the pole the same distance. On an average, from ten to fifteen 40 foot poles are driven every day by the pile driver. Where the earth conditions are just right quite a few more are driven but we will take that as an average figure. The average pile driver weight is 1000 pounds. The average boom is 30 feet. The average minimum drop of the weight is 3 feet when the pole is started, and the maximum drop will average about 30 feet when the pole has been driven and the pile driver is switched on to another one. From these figures you can see 3000 foot pounds to 20,000 foot pounds of force are delivered directly upon the circular piece of ¾-inch boiler plate. This is welded on its circumference as is shown in the diagram. The first blow delivers 3000 foot pounds and if the pole is driven one foot into the ground you can see that the second blow would deliver 4000 foot pounds and so on, getting heavier and heavier with each blow. We can think of no test which would be more severe.

The cast iron pile driving ram head fails because there is no elasticity in the casting. The continued blows of the hammer spread the casting out so that failure occurs along lines corresponding to those of the welded joints. This shows that the welded boiler plate is very superior to the plain casting because the material and also the welding allows for expansion. The boiler plate will expand and take a lot of punishment before it will fail, while the cast iron will not. Once it is cracked the cast iron head must be thrown away and another one secured. Another advantage of the welded ram head is that it can be easily fabricated to fit any size pole. With the cast iron head made in one size it is necessary to shave the pole to fit the ram head and this does not give as good results.

The construction of the welded ram head requires about one day's work. Most of the time is consumed in forming the head preparatory to welding. When the cylinder part is formed it is welded with a heavy bead. Mr. Austin uses "Noweld" welding rod, furnished by the Steel Sales Corporation, Chicago, for this work. The circular part is then tack welded in position and welded with a heavy bead around the top and then turned over and welded with a heavy bead from the other side. This gives tremendous strength to the welded joint. On an average of 200 feet of acetylene and 200 feet of oxygen are required in the welding operation for one ram head.

CHICAGO SECTION A. W. S. HAS WELDING WIRE MEETING

The February meeting of the American Welding Society, Chicago Section, which was held Friday evening, February 5th, was devoted exclusively to welding rods and wire. The advance notice of the meeting indicated that a paper would be presented on the subject of metallury of weld, by Mr. George A. Ellinger, of the Page Steel & Wire Company, Monessen, Pa. Mr. Ellinger was not able to be present in person, as he expected, so his paper was forwarded to be read at the meeting. Following this paper a film entitled "From Mine to Welding Rod," which had been prepared by the Chicago Steel & Wire Company, was shown. After the showing of this motion picture short talks on the importance of welding wire were given by several manufacturers' representatives who were present.

STAMPS FOR GAS CYLINDERS

The interest which has recently been shown by manufacturers of compressed gases in the subject of marking cylinders in order to identify the contents has created a demand for rubber stamps adapted to the marking of gas cylinders. The Collins Stamp Manufacturing Co., of New York City, have already submitted designs for cylinder stamps to several gas manufacturers and their product has met with approval. They are, therefore, soliciting additional business of this kind from manufacturers of gases, in different parts of the country. Mr. Mehrling, of the Collins Company, states that they are prepared to make these cylinder stamps to order.

Penstock Welds Stand Tests

Duplication of Effect of Waterhammer Conditions Fails to Disclose Any Weakness in Welded Seams

WHEN it became known that the A. O. Smith Corporation, of Milwaukee, contemplating entering the Penstock manufacturing field, great interest was manifested by Hydro-Electric engineers from a research standpoint. This interest was centered in the action of waterhammer in Penstock lines, and the result of this action on the metal in the lines. The company had been advised that it had been impossible to get anyone to devise mechanical apparatus for reproducing waterhammer action, let alone build it, and run tests as research for this very important industry, that might uncover results that would enable them to more accurately design Penstock in the future. With this in view the engineers designed the apparatus described in the following article. This design was then submitted to some of the leading Hydro-Electric engineers and their approval of the same received. It must also be stated here, that these same engineers set the design of the vessel to be tested.

Section of A. O. Smith Plant Where the Penstocks are Welded

In view of the wide interest created by the announcement of this test throughout the engineering fraternity, it was decided to invite the officers of the following organizations to attend:

American Society of Mechanical Engineers,
American Engineering Standards Committee,
American Institute of Electrical Engineers,
American Society for Testing Materials,
American Society of Civil Engineers,
American Institute of Mining & Metallurgical Engineers,
American Welding Society,
American Bureau of Welding,
Electrical Testing Laboratories.

The following men from the welding industry were in attendance during at least a portion of the duration of the tests which were conducted at the plant October 11, 12 and 13, 1925:

Mr. M. A. Dantzler, Assistant Manager, Air Reduction Sales Company, Milwaukee, Wis.

Mr. C. F. Williams, Industrial Engineer, Air Reduction Sales Company, Milwaukee, Wis.

Mr. S. W. Miller, Union Carbide Laboratories, New York, N. Y.

Mr. Wm. Schenstrom, Consulting Engineer, Brooklyn, N. Y.

Mr. H. S. Card, Managing Editor, The Welding Engineer, Chicago, Ill.

Mr. J. B. Green, President, Chicago Steel & Wire Co., Chicago, Ill.

Mr. S. H. Smith, Representative, Universal Oxygen Company, Milwaukee, Wis.

Mr. W. M. B. Brady, Arc Welding Specialist, General Electric Co., Chicago, Ill.

Mr. H. J. Mueller, President, Universal Oxygen Company, Sheboygan, Wis.

The summary of the results of this Penstock test are as follows:

Number of shocks, 6440.

Pressure, 100 lbs. to 2000 lbs.

Breaking Pressure, 2700 lbs. per square inch.

Fibre Stress, 32,600 lbs. per square inch.

A previous test conducted on April 28th, 1925, on a similar vessel, but which had not been subjected to shocks such as were reproduced in this test, withstood a pressure of 4,700 lbs. (Fibre Stress of 56,400 lbs. per square inch), when the center of the cast steel head gave way, the welds holding, and showing no leaks.

Therefore, it appeared as though something had taken place to materially reduce the strength of the metal in the Penstock during the test, that needed very careful study. In order to give the engineers interested an unbiased analysis as to the cause of the break. The A. O. Smith Corporation engaged Professor T. McLean Jasper, of the University of Illinois, recognized to be one of the highest authorities on the fatigue of metals in this country, to make a report after a thorough study of the fractured Penstock.

From the report of Prof. Jasper and the Engineers of the Company, it is evident that fatigue was the ultimate cause of the break.

Extract From Report on Cause of Failure in Metal of A. O. Smith Cylinder Tested in Repeated Stress Under Repeated Hydrostatic Loading.

The test was carried out by the engineers of the A. O. Smith Corporation and consisted of a circular cylinder with four longitudinally welded joints and certain welded joints at right angles to these. The cylinder was subjected to about 7,000 repetitions of hydrostatic load and one closely applied load to failure. The fracture was a longitudinal one away from the welded joints.

The calculated maximum impressed stress in the material of the cylinder during the repetitions of hydrostatic pressure was 22,500 lbs. per sq. in. The calculated maximum impressed stress during the loading of the cylinder to failure was 32,600 lbs. per sq. in. The cause of the failure of the test cylinder at such a low impressed stress is one which the following tests were designd to decide.

From the standpoint of the impressed stress on the cylinder at failure, it would seem that the cause of this failure was a general fatigue breakdown because of the impressed stress value as compared with the ultimate strength value of the material of which the cylinder was made. From a study of the fracture itself, the answer is not so clear because, in general, fatigue fractures are quite different from the one shown in this case. This case does not represent fatigue to destruction because the bursting load was a static one and for this reason it was recognized that the fracture, although not one that showed the typical fatigue fracture, might still be the result primarily of fatigue and finally that of static failure in the metal which had been so weakened by the progress of the intercrystalline fatigue that it failed at a relatively low ultimate strength.

The design of the experiments was made, therefore, with the idea in mind that if fatigue was responsible for the failure of the cylinder, this could be indicated by testing the metal that had been

subjected to hydrostatc test condition and comparing it with metal of the same plate but which had not been subjected to such test conditions.

It was recognized that the metal subjected jo the hydrostatic test would fail at the weakest spot in the metal at any particular spot under either one of these conditions it would give lower static elastic and fatigue results than the metal from a plate that had been unstressed.

The experiments as carried out were made on two sets of specimens, one set made entirely from a plate which failed under the original hydrostatic test and one set from a part of the same plate but which was not previously tested. The test results are summarized as follows:

Summary

The endurance limit of the metal in direct stress in the cylinder before it was subjected to the hydrostatic fatigue test is estimated from actual endurance limit tests in the rotating beam machine to be about 20,600 lbs. per sq. in. The actual maximum stress to which this metal was subjected in the hydrostatic fatigue test was somewhere in the neighborhood of 22,500+7,900 lbs. per sq. in., or 30,400 lbs. per sq. in.

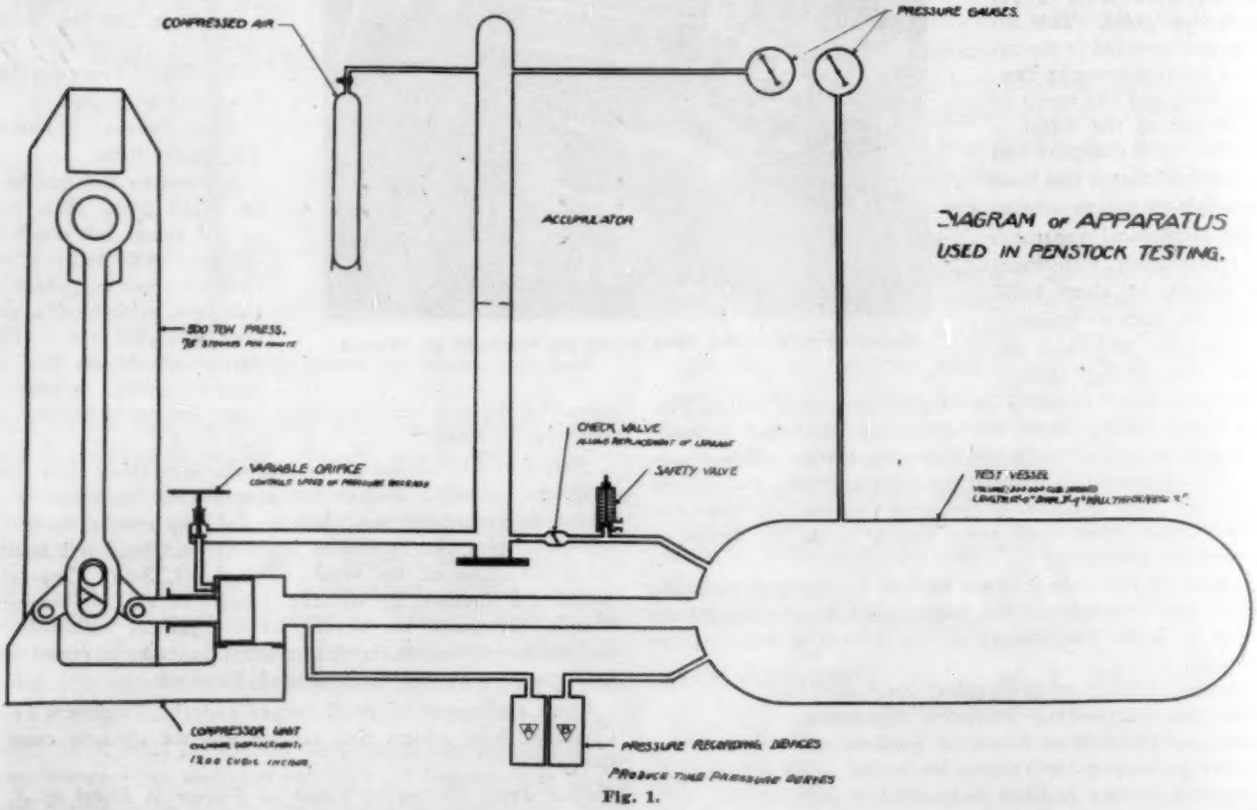


Fig. 1.

The flexure endurance limit of the metal in the cylinder after it was subjected to hydrostatic fatigue was found to be 28,000 lbs. per sq. in. The flexure endurance limit of the metal from the same plate but which had not first been subjected to the hydrostatic fatigue test was found to be 31,000 lbs. per sq. in. This shows that the hydrostatic test had overstressed the metal and had thereby reduced the flexural endurance limit 9.7 per cent.

The test specimens were not selected from near the fracture of the cylinder because it was thought that the fracture had extended into the adjacent metal to such an extent that the subsequent tests would have been erratic and no stable conclusions therefore could have been drawn from them. This was assigned as the reason why the static ultimate strength values did not show a larger per cent decrease from the values given by the virgin metal.

Extract From Report On Penstock Demonstration Test

Waterhammer has proven to be most disastrous to Penstocks, and to imitate such shocks a testing machine was devised and built. With this machine a vessel could be subjected to repeated shocks of variable intensity and the effect of these shocks studied.

THE VESSEL used for the demonstration test was made up of a cylindrical section 45 inch inside diam., 2 inch wall and 8 ft. long. Both ends were closed with hemispherical heads of high grade cast steel, 4 inches thick, making the overall length of the vessel 12 feet. The shell was built up of formed plates so as to necessitate one circumferential weld in the center and four longitudinal welds (see fig. 2). All joints were machine welded. Holes for pipe connections were provided in the heads and the shell had six tapped holes along its axis for petcocks.

THE TESTING MACHINE. Fig. 1 shows a diagram of the equipment used for the test. The principle is as follows:

A Compressor is used for effecting the pressure rise. The test vessel is connected by means of a pipe with one end of the compressor cylinder, the other end being connected with an accumulator by means of a pipe.

The test vessel, both pipes and the cylinder as well as half the accumulator is filled with water under a certain pressure with the piston in the position shown. When the piston moves forward, the water in the vessel will be compressed, raising the pressure to a predetermined maximum, while the water in pipe follows up, approximately maintaining the original pressure due to compressed air in the accumulator. The piston gets its motion from a toggle arrangement with adjustable stroke and actuated by a slotted connecting rod on the crank of a 50 ton press. Consequently the piston is moved forward at a speed controlled by the crank but after the toggle has pressed the straight position the slot in the connecting rod allows the toggle to collapse which permits the piston to snap back. In other words, the pressure is gradually built up from a min. to a max. and then suddenly,

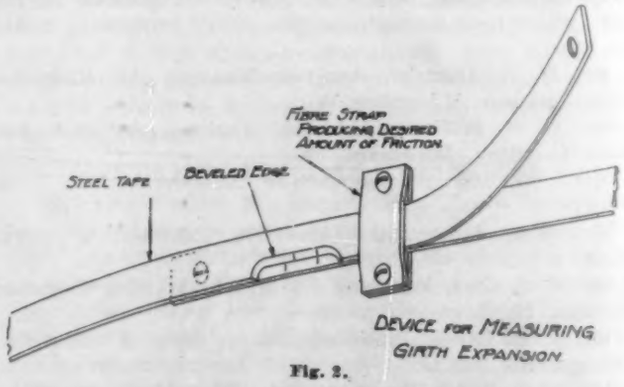


Fig. 2.

(in less than 0.15 sec.) made to drop back to the min. where it remains constant for the last portion of the stroke. The energy, suddenly released at the pressure drop, is absorbed by wire-drawing the water thru an adjustable orifice in the pipe,

and to prevent the piston from hitting the bottom of the cylinder a choking pin, like in a dash pot, is provided. Thus the action of the machine can be perfectly controlled and a wide latitude of test pressures obtained. The pipe leading from the cylinder to the test vessel, is made very large in diameter so as to reduce the velocity of the water column to a minimum. This velocity would otherwise reach dangerous proportions. The same holds true about the pipe leading from the cylinder to the accumulator. As a precaution, however, both pipes were securely

Fig. 3

anchored to each other and to the floor in two places. Besides furnishing the back pressure the accumulator also serves to replace water lost from the vessel side of the piston due to leakage. For that reason the accumulator is connected to the test vessel with a pipe and backflow during pressure rise is prevented by a check valve in this line. Provision is made for maintaining desired air pressure in the accumulator, also for pumping water into the system, and in a number of places plugs and petcocks make possible the elimination of all air in the system.

INSTRUMENTS. Pressure gauges were connected to the test vessel and the accumulator and, together with other instruments, located alongside the machine. These instruments consisted of pressure recording cylinders attached to a standard Tachograph with motor drive. It was thus possible to obtain time-pressure curves at any moment desired.

To record the changes taking place in the test vessel itself during the experiment special arrangements were made. Elongation of the cylindrical shell was measured in one place and expansion of the girth in three places. Fig. 2 shows the device used for these readings, a steel band held securely at one end and the other end free to slide with some resistance. The approximate location of these instruments is made clear on Fig. 3. To make a further study of expansions, provisions were made to use Extensometers.

General Arrangement. The compressor unit in the press was located within the building. The test vessel itself with accumulator and piping was mounted on a structural steel frame which was placed in a pit outside of the building (see Fig. 3). From the compressor unit two shocks are obtained during each cycle of the crankshaft or about 15 shocks per minute.

Demonstration Test During October 12 and 13

After a short trial run on October 11th, the actual test was started October 12th. The initial or accumulator pressure, as well as the peak pressure, was varied, but 72 per cent of the test was carried on at 2,000-pound peak pressure. At intervals readings were taken on the recording devices.

Measurements of the longitudinal and girth tapes were taken on three occasions. The two first measurements were taken while the load was being applied in shocks, and it was found that no permanent expansion took place. On the third occasion the vessel was under a steady load, preparatory to the destruction test.

The test was interrupted several times in order to allow correction of minor troubles.

A special series of tests was made while the machine was in operation, using the Extensometer. Readings were taken under various pressures parallel with and at right angle to the axis of the vessel as well as at every 10 degrees between these two positions. The distance between points was 6 inches, and on account of its shortness compared to the diameter of the vessel no attempt was made to correct for the curvature of the surface. It was noted that in no case did any noticeable part of the elongation become permanent, indicating that for these test pressures the elastic limit was not exceeded.

In all, the test vessel was subjected to about 7,000 shocks during nearly 8 hours of actual running time. At the end of this experiment there was no apparent defect in either the welds or the plate.

The fatigue or shock test being brought to a satisfactory conclusion, the plans called for a final Destruction Test of the vessel. All pipes were disconnected except the ones leading to the pump and the pressure gauge, and all openings plugged up. The test pit was then covered with planks weighted down by sand bags. When the vessel was properly filled with water and all air removed the pressure was gradually raised until 2,500 pounds was reached. Here the pump was stopped and the pressure relieved for a few minutes while readings were taken. The pumping was then resumed and at about 2,700 pounds per square inch the vessel burst along its full length, as shown on Fig. 4. In no place did the crack run along a weld (see Fig. 5 and Fig. 6), and the welds seemed to have no influence on the location or direction of the fracture. It will be noted that the center portion shows a considerable bulging out (see Fig. 6). Outside of the main longitudinal fracture, which branched out at the ends, two circumferential cracks appeared near the center of the vessel. All fractures showed a very coarse grain.

Fig. 4

Conclusions

It is evident that in the shell, which was not annealed, certain initial stresses remained after welding. The outside of the shell must have carried tension of appreciable magnitude while the inside suffered under equally high compression. Recent observations substantiate this theory. That being the case it is obvious that a sudden shock given to the vessel will relieve the stresses in the inner layer up to the neutral axis and add to the stresses in the outer layer, possibly exceeding, or at least approaching the elastic limit in the extreme outer fibers. Repeated shocks are then apt to break down the resistance of the outer layers, whereas a slowly rising dead pressure might have allowed the material to

stretch and gradually bring the entire section in action. Previously conducted bursting tests substantiate these assumptions as well as the conclusion that the Fatigue test broke down the strength of the vessel, and that this alone was responsible for the low ultimate resistance offered by the vessel used in this test.

(*NOTE: There is convincing evidence here of the value of the arc welding process in such construction. It could be shown easily by comparative diagrams that the welded type of Penstock ha a considerably higher capacity, and there is also a greater freedo allowed to the designing engineer in changing dimensions. Th tests described above were not intended primarily to determine th efficiency of the welded joints, but the complete dependability o the welds was demonstrated, as an incident to the testing of th Penstock under repeated hydrostatic loading.—Editor.*)

Fig. 5 Fig. 6

Pipe Line Welding*

The Contractor's Opinion of the Essential Elements of Successful Pipe Line Welding Operations

By L. A. Kelley†

THE history, advantages and reasons for welding pipe lines versus other types of construction will be discussed only as they affect this particular district, which applies to Oklahoma, Kansas, Arkansas, Louisiana and Texas, known in Oil "Lingo" as the Mid-Continent.

Welding of pipe lines up to 1919, by oil and gas companies, were catalogued under the heading, "Failure." Not that several lines were not delivering real service, but results were very discouraging. Oil and gas lines form an artery of service upon which the operating companies could not take a chance. Welding languished and was almost classed obsolete; the companies who in 1915-16 were enthusiastic, were now condemning it.

It was at this time that the Prairie Pipe Line Company decided to experiment by laying a major oil carrier line by the welding process, placing the work under the supervision of Mr. N. E. Wagner, who carried the construction forward, using practical methods, and providing for emergencies which arise in the use of welded lines.

Prairie Pipe Line Successes

All are familiar with the success of this line and the impetus given the welding industry throughout the Mid-Continent District, and we should therefore be generous in the credit given the Prairie and especially Mr. Wagner.

It is worth while to check back on the whys of the failures of earlier attempts. Of first importance, as always, is the welder. Pipe line welding was comparatively new and erratic at best in providing employment. Welders with experience were very scarce and pipe lines provided a school for learners with disastrous results.

Second—Equipment. Very little attention was given this item, as a torch is a torch and any type will do. But it will not, as a torch must be adapted to the strenuous service required, economical in operation, well built and easily adjusted to varying pressure and well balanced. The rest of the equipment is important and should measure up to the high standard maintained in the torch.

Third—and, to my mind, of major importance—is the little item, filler rod. Do you think you could interest anyone today in welding a large line with vanadium steel? The answer is obvious. Yet, in 1915 this was done and the line is in service at present, although it is not a success. Best results are obtained with standard Norway iron with lowest carbon content.

Contraction Is Important

Fourth—Method of Construction. Originally a weld was considered as strong as the pipe. Occasionally one is, but the average is today below that. What must it have been then? It was thought not necessary to provide for contraction and expansion, but today we consider this provision as THE item of major importance.

**Paper prepared for the Mid-Winter Convention of the Gas Products Association, Chicago, Jan. 20-22, 1926.*

†Kelley, Dempsey & Co., Tulsa, Okla.

These represent but few of the reasons for failure, while the remainder could be classed under one of the above divisions. The fact that lines constructed at present are meeting the expectations of every interest is evidence that constructive thought and ideals have replaced the negligent, careless attitude of bygone days.

The Prairie have added hundreds of miles of wholly welded lines, the Magnolia, Empire, Marland, Phillips, Sinclair, and in fact ninety percent of the major companies have stopped, looked and welded, until a map would show an appreciable network of welded lines throughout the Mid-Continent district.

Welded Lines Now a Success

Welded lines are today a tremendous success. The superintendent is no longer gray because of the continuous fear of broken couplings or blown rubbers with the loss of product and profit.

But welded construction will continue to improve—a standard of "100 percent weld and eliminate every strain" will win the laurels of every man's respect for welding and then 80 percent of large pipe projects will be welded.

One hundred percent welds and the elimination of pipe line strains presents a multitude of problems. By "100 percent welds," I mean a class of work which is the result of first-class workmanship, proper materials and sufficient reinforcement. But "100 percent welds" increase cost of production, retard speed and eliminate a goodly number of applicants for welding jobs. However, they increase the confidence of the user, make the contractor proud to deliver a no-leak, no-break line, and elevate the status of the welder, the contractor and the trade they represent.

Good Organization Required

Now, I stated that elimination of strains was necessary. To have a perfect weld, the human equation must be perfect in operation. To lay a line without strains demands an organization with the "know how" well developed, because placing pipe in the ditch so that there is always a push, one joint against the other, requires a proper and careful distribution of slack or excess pipe. The making of overhead bends and sags calls into your organization another trade—that of "pipe lining," but a wholly different class of pipe lining is demanded than by either coupling or threaded joints.

By slack, we mean the excess amount of pipe over that which is required to just make the line, and is a provision against breakage caused by contraction or expansion, and must be carefully distributed, especially over uneven ground, as too much will cause the line to arch above the ditch, which must be cut out or it will creep to the nearest overbend and push that out of the ditch, thereby loosing the slack and buckling the bend. Or, if there is not sufficient slack, the result will be a tight line, which will break the weld or pull the "sag" from the bed.

The amount of slack that a line will take depends upon the width of ditch above the diameter of pipe. The *necessary* amount is a subject disputed by a number of engineers, and as this paper is not offered as an argument, we will present neither side.

Good Work Will Mean More Work

A well constructed line will by its reputation pave the way for two more, and a line with ill repute will disrupt plans for three.

As a matter of diversion, I would like for an engineer, chemist or metallurgist to tell why a pipe line of any size or weight will float with the buoyancy of cork in a ditch full of water, or across a river. Simple, perhaps, but peculiar. And let me assure you that real weight is required to force a twelve-inch pipe to bottom before covering. This is one of the things we class as "grief."

Permit me to submit a very efficient, economical and speedy method of testing leakage in a pipe line.

Testing the Line

A pipe line of any length with both ends closed air tight is placed in a ditch when the surface temperature is higher than underground. The coolness of the ditch will form a vacuum within the pipe which will register on a delicate gauge. However, the smallest leak will prevent a vacuum forming and then the leak must be found by the usual method.

From a Contractor's Diary we might read some interesting confessions, but in taking one we have an item that covers a multitude of sins and one of the reasons why welding was classed a failure. We might label this Self-Destruction.

Original propaganda on welding stressed the saving involved in welded joints versus couplings or screw threads to an unreasonable point, or at least the superintendent had the idea that welding was vastly cheaper. The contractor had to face a proposition over which he had no control, with the result that welding suffered, by reason of inferior work and cutting corners so that a profit could be realized, and in many instances the work was "rotten."

Welding Standards

In order to get the costs within the scope of reason a line was classified by weight of pipe and whether it carried vacuum, gas under different pressure, oil or water; in other words, high or low pressure lines, and bid was submitted accordingly. Apparently, a system like this would permit one to overcome many obstacles—which it did—generally resulting in a request to the welder to deliver plenty of welds and a hope that it didn't leak—which it did. Welding was not making strides except in those lines where pipe was too badly damaged as to render it impossible to rethread or couple.

My firm recognized these ills and in 1922 put in to practice "Standardizing of Welds." Regardless of size of pipe, class of service, amount of pressure or whether oil, gas or water, the weld was to be of such size and quality as to meet every requirement of handling, bending, pressure or service.

By this means we succeeded in backing up and making ring true our motto:—"Make and Hold Respect." Permit me to plead "modesty" in stating we believe we have done much to build up respect for welding among the oil and gas companies of this district.

With the advent of modern methods, the "dope" on welding costs has been upset, with the result there is a "false valuation" existing and welded construction has furnished a source of heavy losses to several contracting firms this year.

It costs more to make 100 percent welds, and it costs tremendously more to place pipe in ditch under present rigid specifications—an increase of approximately 60 percent over old methods, but the process is just now where it should have started and the things are being done that should have been on the first line; further, welding will continue to make strides because of it.

Competition is serious as between the rubber coupling type and welding, as there is but a small margin between them in the completed job. However, in the laying of new 40-foot pipe there is a splendid margin in favor of the welded joint.

At first glance it would seem impossible to adequately adjust welding cost, but I believe if a standard of welding specifications were accepted by all interested that costs would quickly adjust themselves and result in improved construction and a well balanced respect for welding.

Outlook Is Encouraging

The conditions as we face the year of 1926 are very encouraging. Pipe line companies are rapidly becoming convinced of the merits of welded lines. Their engineers are closely watching results in their lines and those of other companies. A continual report of no breaks, leaks, damage or loss of product, no maintenance, less deterioration, sixty-minute delivery service every hour, has made friends with faith and confidence.

Our most sincere knockers are the "Ancient Order of Line

Walkers" whose vocation dates back to the first pipe line. His trade has fallen in evil days. He is no longer a necessity. A welded line is his "Waterloo."

I would like to classify my firm as welding specialists, inasmuch as we do no part of pipe line work but the handling and welding of the pipe, taking no part in the ditching, stringing or other items connected with the construction.

We are vitally interested in welding successes for the future of welding as a trade and industry, and are proud of every job that will "Make and Hold Respect," no matter by whom or where constructed. Unanimity of effort along universal lines, by the manufacturers of gases, materials and equipment, engineering departments of oil and gas companies, the field welder and the contractor, co-operating in a drive for 100 percent in results, will place welding as the standard of efficiency in pipe lines.

INDIANAPOLIS ELECTRODES FOR COMMERCIAL PURPOSES

In 1911 the Indianapolis Switch & Frog Co., Springfield, Ohio, placed on the market welding apparatus and rods which had been developed especially for the construction, reclamation and maintenance of electric railway tracks. Their portable electric welders, flux, connected steel electrodes and specially designed rail joints have been widely used by street railways all over the country, in fact, it is stated that during the past 15 years over 20,000,000 of their electrodes have been used in reclamation work. The pioneer work and subsequent development work of this company has put them in a position to supply the metal work, brass and general line of supplies and materials for electric arc welding. The Indianapolis line of welding rods includes four grades, A, B, C, and D, shipped under yellow, red, green and blue tags, respectively. Grade A is a hard rod for shallow cups and service work for low voltage; Grade B is for general service work for normal, or high voltage; Grade C is a softer material for light repairs or parts to be machined, and Grade D is a soft quarter inch electrode for heavy repairs of parts which are to be machined. These are the leading items in the line of welding rods. Three other grades of soft material are also included in the brass list recently issued by the company, which emphasizes the fact that the cost of the filler material is the smallest item in the cost of a welding job.

WELDING IN GREENHOUSES

In a recent issue of the Florists' Exchange there is an article by B. S. Brown on the subject of welding in green houses, which describes the welded pipe installation in the new houses erected by the L. C. Fields Co., Kansas City, Kansas, a couple of years ago. According to this article a great deal of expense was saved by using second hand pipe and boiler tubing and taking advantage of the welding process throughout the construction.

One picked advantage in the welded construction was the matter of convenience when changes had to be made at a moment's notice. It is stated that the entire installation, including labor, welding and materials, cost less than new fittings alone would have cost. The welding began right at the boiler, where the first riser for hot water enters. At the top of this riser the 2 feed lines are welded. One of these feed lines extends off away across the line. The other extends to the opposite side. From each extend the throat lines, east and west. The main feed and throat lines are suspended loosely on brackets. These brackets are hayrake tines welded to the steel frame of the building. The throat lines being held in this manner have an opportunity to expand from the overhead throat line pipes leading down to headers at the ground.

A readjustment was recently necessary because the beds were raised from the floor and the heat pipes had to be rearranged. The torch made a great saving in this case, because it was so convenient to cut the ends of the pipe and join them together at any angle desired. The use for welding throughout this green house are so enormous as to almost defy listing and in spite of the fact that a great deal of the equipment has been fabricated from used material, the operation is very efficient and allows for a number of economical short cuts. Whenever a bracket is wanted a piece of pipe or a bed rail, angle iron, or a rod can be welded to the steel frame of the house and any surface or attachment can be welded. Pieces of pipe or rod can be cut or bent as desired to fit together wooden pieces for bolting or screwing. Attachment tools can be made or mended and the opportunity for odds and ends of repairs is almost unlimited.

KORO ELECTRIC EXTENDS SALES ORGANIZATION

The Koro Electric Company, of Chicago, Ill., are manufacturers of the Koro line of arc welding wire. This wire is coated with a special flux, which is designed to give a more uniform arc and speed up the work, as well as float out the impurities in the metal. The manufacturers claim that the method of application of this flux insures against its breaking off easily. A distinguishing feature of this electrode material is that the steel itself is rolled and grooved in such a way that the electrode has a beaded appearance. The company has been spending considerable time in the development of this filler material and is now giving considerable attention to the extension of its sales organization, particularly toward making desirable dealer connections in different parts of the country, so that a national distribution for this product can be obtained.

Plainly Marked

HOW LINDE AND PRESTOLITE TANKS ARE MARKED

Both the Linde Apparatus Company and the Prestolite Acetylene Company have adopted a practice of marking all shipping containers to indicate clearly the contents of the cylinder. The photograph above shows the different types of cylinders used by these companies and indicates how clearly the contents are indicated by their new methods of marking.

Compressed Gas Manufacturers Meet

New York Meeting Marks Close of Year of Activity— Standardization Committees Have Busy Year Ahead

AT the annual meeting of the Compressed Gas Manufacturers' Association held at the Hotel Commodore, New York, January 25, officers for the year 1926 were elected as follows:

Fredk. A. Johnston, President
John C. Minor, 1st Vice-President
H. S. Smith, 2nd Vice-President
John H. Luening, Secretary-Treasurer

Consideration was given to expanding the activities of the association by undertaking the preparation and regular revision of collections of technical information and rules for safe practices. The continuation of association research activities was also discussed and these matters were all referred to the Executive Board.

Through the reports of our various committees the work of the Association for the past year was reviewed. Among the important accomplishments were included the compilation of data and arguments relative to proposed changes in the freight classifications of empty cylinders and compressed gases and activities which have lead to the wide adoption of the practices of marking on compressed gas cylinders the name of the contained gas.

The Test and Specification Committee reported many investigations including testing of gas cylinders, specifications for gas cylinder safety cylinder safety devices, mercury column pressure measuring instrument, cylinder testing reports, methods of loading gas cylinders, measurement of compressed gases, and standardization of cylinder valve outlet threads. In connection with the standardization of cylinder valve outet threads it was reported that a standard thread for oxygen has been tentatively adopted and the drawings of this thread have been prepared and will shortly be distributed to the members of the industry. Consideration is being given to the development of this standard by including not only dimensional limits of the thread itself but also certain dimensional specifications for the union nut and connection nipple.

The meting was addressed by Mr. W. Spraragen, Secretary of the American Bureau of Welding, who brought to the attention of members the Bureau's proposed pressure vessel investigation in connection with the modification and expansion of the present A. S. M. E. Code for Welded Unfired Pressure Vessels. It is planned to have the technical investigation itself carried out at the Bureau of Standards. The need for changes in the present code for unfired pressure vessels, and the importance of the proposed investigation were emphasized.

The annual dinner of the Association followed the meeting and was held at the Hotel Commodore, New York. There were approximately 250 present, including representatives of a large percentage of the compressed gas manufacturers in the United States and Canada. There were short addresses by Colonel G. E. Carleton, of the Bureau of Explosives, the incoming officers of the Association, Mr. J. R. Colby, Chairman of the Asosciation's Canadian Section, Peter C. Spence, Chief of the Bureau of Fire Prevention of New York, John F. Dixon, of the Bureau of Combustibles, New York, P. Samuel Rigney, Vice-President of the Roessler & Hasslacher Chemical Co., and an Executive Board member, Mr. A. G. Oehler, President of the American Welding Society, C. E. Skinner, Chairman of the American Engineering Standards Committee.

Compressed Gas Manufacturers' Association Banquet

DENVER OPPORTUNITY SCHOOL GROWING RAPIDLY

Information has just been received that the first unit of the four-story building under construction for the Denver Opportunity School, Denever, Colorado, is nearly completed. It is estimated that when all the units are completed the school will be able to take care of 7,000 a day. This is a free school with no entrance requirements and no restrictions as to the time of entry or the amount of time devoted to instruction. Instruction is given in nearly forty subjects, including complete courses in acetylene welding and electric welding. The welding courses have been approved by the educational committee of The Gas Products Association. The school has special classes for older people who do not read or write English, an employment bureau to assist students in getting positions, a school library with an experienced teacher in charge to advise pupils in the selection of reading matter, and it also has a unique custom of serving a bowl of soup, without expense to students who desire to come directly to school from work. The present attendance is about 3,500 per day. The tremendous enrollment is sufficient indication of the splendid work which this school is doing.

Welded Construction for Runways

Crane Runway Fabricated from Structural Steel, in Which Arc Welding Replaced All Rivets

THE process of electric arc welding has again made an important stride forward in its march to general acceptance as the logical means of joining steel members in the structural field. Important though it was, engineers hold the new application of welding in place of riveting, has as great a significance as did its recent use in the fabricating and erection of the ninety-five tons of structural steel which went into a building at Canton, Ohio.

As is the case of the first commercially sold, all-welded building, it remained for the Morgan Engineering Company of Alliance, Ohio, to replace rivets by electric arc welding in another of the major structural fields. The latest accomplishment of this firm has been in the building of a great industrial crane runway without the use of rivets.

Fig. 1

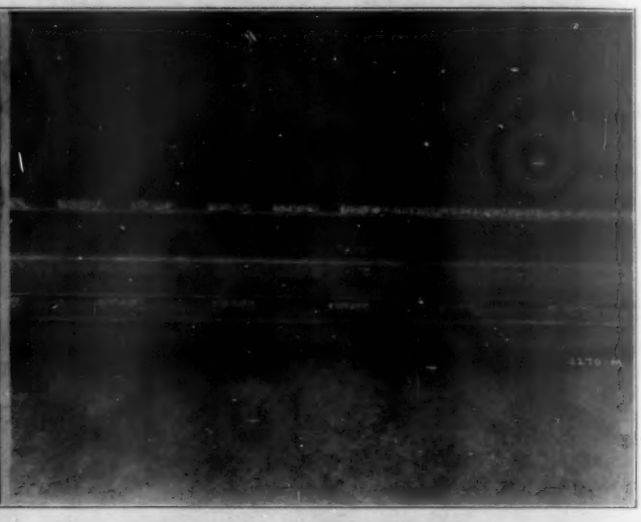


Fig. 2..

The importance of this new accomplishment may be better understood when it is known that the welded runway and supports constituted one of the major portions of a thirty-five thousand dollar installation made by Morgan for the Coplay Cement Manufacturing Company in its plant at Coplay, Pa. In addition to this the contract called for the supplying of a ten-ton crane of the bucket handling type, to be operated over the runway.

Involved in the welded job, there was approximately sixty-five tons of steel for the supporting frames and crane girders, which provide a runway of two hundred and forty-five feet. For the first time, so far as is known welding replaced riveting on all of the shop-made connections. "Stable-Arc" welders, made by Lincoln Electric Company, Cleveland, were used on the job.

While the fact that the sixteen supporting frames and the fourteen girders each of 35 foot length for the Coplay crane runway were all fabricated by welding is significant in itself, yet the greatest importance to be attached to this job comes from the extended possibilities it opens up for the use of this method of joining steel on a large scale and in a great diversity of fields.

Engineers may see in the results obtained through electric arc welding on the Coplay undertaking, one more evidence of the acceptance of welding as a general means of joining structural steel members. Records of the Morgan Engineering Company, as well as those made by other distinctly disinterested authorities, show that this welded runway has opened a channel by which this class of work may be simplified, and products of super-strength be produced.

The Morgan Engineering Company has over a period of years applied the process to larger and larger undertakings as their own engineering research indicated the assured desirability of doing so. The Alliance firm first used the process on such things as locomotive repair, production of crane gear boxes and minor connections of structural steel for buildings; then throughout the Canton building, and now on all of the shop work for the Coplay crane runway and its supporting frames.

For more than half a century Morgan has been known the world over as builders of cranes and crane runways. Not until it had been definitely proven that the welding process was superior in all respects to the older riveting method, did the firm apply it to a job bearing the Morgan name.

Like a constantly growing group of manufacturers the Coplay Cement Manufacturing Company has maintained that the newer process of joining metal has an almost unlimited field for application on production work. In its own shop, this firm has been constantly using electric arc welding on a diversity of jobs, so that it was not surprising that when the need came for a new crane runway electric arc welding was used for the shop work.

The extent to which welding was applied in this one crane runway job is well illustrated from the fact that there were 1800 linear feet of continuous bead on the fourteen girders and 2035 feet in intermittent welds on these same steel members. On the suporting "A" frames there were 596 feet of continuous bead and 403 feet of intermittent beading.

The fourteen plate girders make a runway of seven bays, with a span of the crane supported by this runway of 100 feet, center to center of rails. The height of the twelve "A" frames supporting the girders is twenty one feet eleven inches, while four others run to a greater height in order to make a roof over a portion of the runway.

The load on the runway from each of the 4 wheels supporting the crane is 55,300 lbs. plus 25% thereof for impact.

Although this heavy duty runway was the first to have been shop welded all of the way through; was submitted to unusual

tests and designed for the greatest possible strength, reports of the Morgan Engineering Company show that a saving of 15 per cent of shop labor costs was affected over the expense which would have been involved had riveting been used. The time required for welding of the girders totaled 1,050 hours, and for the twelve supporting "A" frames 330 hours.

The crane girders for the Coplay job were made up of a web plate 42 inches wide by one half inch thick, with two 6 by 4 by five-eighths-inch top flange angles covered by a fifteen inch stiffer channel. A bottom flange of two 6 by 6 by nine-sixteenth-inch angles was provided. Backs of the flange angles

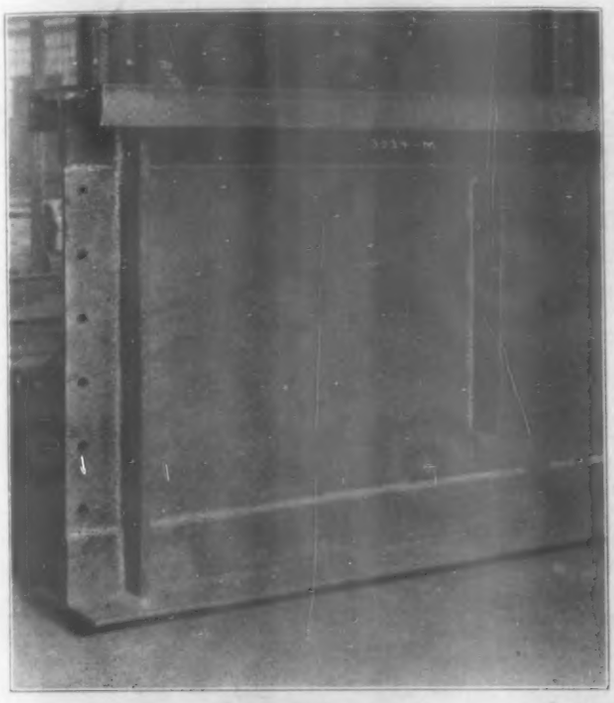


Fig. 3

were set three eighths of an inch from the edge of the web plate, and each angle then welded to the edge of the web plate.

On this work a third bead was then laid joining the two beads connecting the angles to the edge of the web plate. Flange angles were also welded to the web plate along the toe of the leg against the web plate.

All of this welding was continuous for a distance of approximately four feet from each end of the girder. On the balance of the distance to the end of the girder intermittent welds were used and were spaced two and one-half inches alternate between the backs and the toes of the angles. On the average these welds were about two and one half inches long.

Figure 1 shows the manner of welding between the back of the angles and the edge of the web plate. Figure 2 shows the manner in which welds were made between the toe of the angle and the web plate. This same picture illustrates the method of attaching the 15 inch stiffener channel to the top flange angle, by the intermittent welds about two and one half inches long, spaced about 8 inch centers.

Figure 3 shows the manner in which flat bars were used for stiffeners. These bars were edge welded to the web and top and bottom flange angles. From this same picture may be seen the manner in which a flat bar was welded to the web, which takes the bracket for a footwalk, and extends the entire length of the runway.

From Figure 4 one sees the attractive make-up of a completed and all-welded girder. The view shows one of the thirty-five foot girders exactly as it was when completed and ready for shipment to the Coplay plant from the structural shops of the Morgan Engineering Company. As it stood this girder alone had a total weight of approximately 6,800 pounds.

In building the great supporting "A" frames the Morgan Engineering Company simply replaced the rivets that would have been used in the past with welds of various lengths, according to the requirements set up by the engineers on the job. These frames, which support the runway girders, were set on top of concrete piers at the Coplay plant, in the same manner as would have been employed on any average job of corresponding size.

As will be seen from Figures 5, 6, and 7 the entire "A" frame was built up by welding together the different steel members. Cross pieces, plates and angles all were simply joined with the different types of beads, some of them being continuous and others intermittent, according to the special burden which was to be carried by any given portion of the frame.

A very good idea of the appearance of the "A" frames is given through Figure 8. Here is a completed frame, as it appeared after all welding had been done, and the support was ready to ship from the Morgan plant for installation in the cement manufacturing plant.

Of the total of 16 frames, such as that illustrated, all but four were of the standard length for this job, twenty one feet eleven inches, each having an approximate weight of 2,500 pounds. The remaining four, identical save for the fact that they had extensions to carry a roof over one portion of the runway, each entirely electrically welded, weighed approximately 3,600 pounds apiece.

It is important to note that in addition to the fifteen per cent saving affected on shop labor on this runway job through the use of welding, in place of the older riveting methods, an additional saving was made possible in the quantity of material required. On the "A" frames it was possible to somewhat reduce the quantity of steel required over that which would have been involved on a riveted job; this came about in the matter of

Fig. 4

detail gusset plates, which would have been necessary had the "A" frames been riveted.

It becomes obvious, from the above discussion of the manner in which both the runway girders and supporting frames were built in the Morgan shops that many of the elements which of necessity are involved in each riveted job of the sort automatically are eliminated where welding is substituted in the joining of steel members.

Engineers of the Morgan plant report that the welding on the Coplay work resulted in materially decreasing the amount of preliminary drawings involved and in reducing the time devoted to engineering work prior to the actual start of construction on the runway. In the course of fabricating the girders and frames, it was not necessary to consume any time in the punching or making of holes in the steel members, such as would have been

required had the plates, angles and beans been joined by rivets driven through them. In other words the use of electric arc welding tended to put the job on a simplified basis.

More important even than this phase of the job, was the fact that through the use of welding it was possible to get uniformly good connections. As in the case of the Canton all-welded structural steel building for the Peerless Auto Sales, the Morgan Engineering Company engineers found that arc welding gave constantly good welds.

As has been demonstrated time and time again, through the application of electric arc welding in the joining of steel members, tests conducted on the crane runway showed the welded joints to be at least equal in strength to the steel which they served to join. When compared with the riveted joint, which at best is said to be but from 65 to 75 per cent, it becomes obvious that the welded connection is by far the more desirable.

Under the direct supervision of R. A. Storm (now deceased) for the Morgan Engineering Company and an outside firm of technical experts which represented the interests of the Coplay Cement Manufacturing Company, the welded joints of the runway were put to the severest possible tests, and in every case stood up without signs of giving away.

One of the tests was conducted in connection with a plate 13 by three-eighths by 10 inches, which was edge welded to the flange of a I-beam. The 13-inch edge of the plate was welded to the I-beam and the 10 inch side was set vertical.

The plate was hit a total of sixty blows with a twelve pound sledge and bent into approximately the shape shown in Figure 9. This treatment did not affect the weld in the slightest.

Mr. Storm then had a steel ram weighing 587 pounds, hung from an overhead crane. This was used to strike the plate a total of forty six blows, with four men behind the ram, endeavoring to break the welded plate from the I-beam. The blows were all directed as close to the bottom of the plate and the weld as possible. Still after all of this very severe abuse there was not a single sign of cracking in the weld.

Another test to which this type of welding was used upon the runway was put is illustrated in Figure 10. A plate 8 by three-eighths by 9 inches was welded to the web of an I-beam, the 9 inch dimension being vertical.

The plate was then bent by hitting it about sixty blows with a twelve pound sledge. The result upon the plate is shown by the bent position which it represents in the picture. However, here again both the Morgan engineers and those representing the purchasers of the runway, report that there was absolutely no evidence of a break in the weld.

Other tests conducted both before the runway was started and upon parts of it throughout the time it was being built in the Alliance shops, showed equally as well for the welded joints. Thus it is but natural, that the engineers of the Morgan and Coplay companies, both feel that in the production of this shop-welded crane runway, has been created a product of super-quality.

In summing up the Coplay job, it is well not only to keep in mind that the welded runway and supports not only withstood every sort of abuse, but that it has further opened up the path for extensive applications of welding in other fields, where riveting has held sway in the past largely through long habit and not because it provided anywhere near a maximum of satisfaction.

As has been the case in numerous other instances on record, the application of welding on the runway brought about a material saving in shop labor costs; involved somewhat of a saving of steel materials, and helped simplify this class of work.

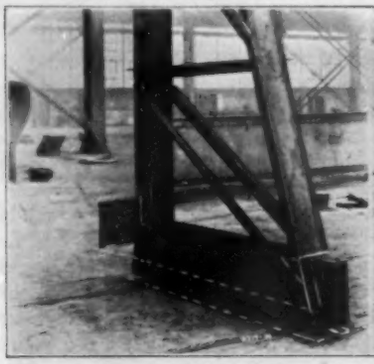


Fig. 5

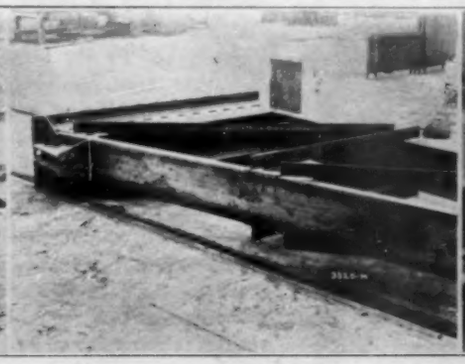


Fig. 6

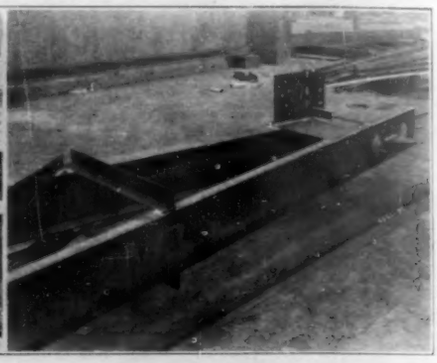


Fig. 7

Fig. 8

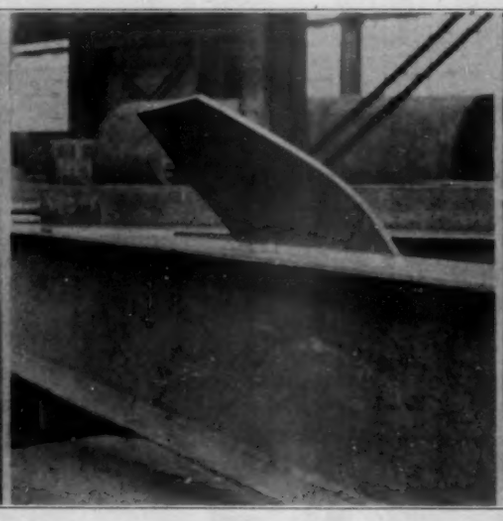


Fig. 9

Fig. 10

G. P. A. Has Big Winter Meeting

Record Attendance at Convention Which Features Papers on Possibilities for Future Development

FUTURE prospects and possibilities of the gas welding industry formed the basis of the program of the twelfth Mid-Winter meeting of the Gas Products Association, which was held in the Palmer House, Chicago, January 20, 21 and 22. The membership of this association comprises about fifty oxygen producing plants, serving industrial centers throughout the United States. Affiliated with the oxygen producing units are a number of acetylene compressing plants, and the association numbers among its associate members a large number of manufacturers of oxy-acetylene welding and cutting apparatus and supplies. Since most of the products of all members are consumed in the welding and cutting industry, the development of this industry is of vital importance to them, in addition to their common problems of operation and distribution.

Gas Products Association Convention, Palmer House, Chicago

During the three-day meeting, which this year was marked by a greater attendance record than any previous meeting, the time was about equally divided between executive sessions, at which questions pertaining to the manufacture and distribution of oxygen are discussed, and open sessions, where papers were presented which contain considerable material of interest to the welding fraternity. Social features of the meeting included a theater party on Thursday evening, a large group of members enjoying the performance, "Castles in the Air," and a splendid banquet served at the Palmer House on Friday evening.

The subject matter of several of the important papers prepared for the open sessions is indicated in the following abstracts: *Welding at the Hawthorne Works of the Western Electric Co.*, by E. L. Swangren, Western Electric Co. In addition to describing in detail a number of interesting welding jobs, which contained valuable operating hints, this paper brought out a number of points which can well be put to good use by large industrial plants. It is noteworthy, in the first place, that proper conduct of the welding operations has resulted not only in consistent satisfaction, but also in the increase of the welding department from one operator to a force of eighteen welders and three cutters, handling a range of work from the smallest pin to the largest punch press. It is the policy of the department to consider no welding problems impossible, but bring every resource into play to find the solution. The result is partly seen in the fact that practically all pipe lines, whether for oil, water, gas or steam, are welded, and couplings and rivets are rapidly passing into the discard. Incidentally, the company requires the same high standard of work from its welding department on repair operations which is required of all departments in production. Drawings are supplied for practically every welding job, and a supervisor is always available to check the work, and assist the men in getting the desired quality. Whenever a new welder is put on the payroll, he is given standard instructions in the nature of the work, and the care of his apparatus. Then he is given a complete welding unit for which he is made personally responsible. He is provided with a place to lock it up when not in use, and has the same outfit to work with as long as he remains at the plant.

Bronze Welding of Cast Iron Pipe, by H. Y. Carson, Research Engineer, American Cast Iron Pipe Co.—The short life of steel pipe, on account of its tendency to rust, has created the demand for cast iron pipe for several kinds of service. Experiments made so far would indicate that the ideal cast iron pipe line is probably one in which the short lengths of pipe are welded together into long sections and the long sections of the line joined by flexible couplings, since the continuous welded line does not work out so well in cast iron as it does in the case of steel pipe. There has been some fear expressed that corrosion would shorten the life of the welded joints, but there is much evidence to indicate that this is not the case. It has been possible to make a great many tests of bronze welds in cast iron, and it is readily shown that such welds can be made stronger than the pipe itself. Further tests have been made, to determine questions of procedure, and these tests favored the straight butt type of joint which is commonly recommended for his work. Ordinarily the best results were secured by welders who were progressing at the rate of about two inches per minute. The total width of the bronze collar should be about 50 per cent greater than the thickness of the pipe shell, and the thickness of the deposit about two or three-tenths the thickness of the pipe shell. In general it is recommended that in a welded cast iron pipe line there should be less than one hundred feet of welded line between any two flexible couplings.

Welding in the Making of Spiral Pipe, by Carl Naylor, president, Naylor Spiral Pipe Co.—This product meets the demand for a pipe which is light and strong and has a smooth interior. A straight seam pipe of thin shell is too flimsy for rough service. Spiral pipe has a stout reinforcement built into it. The pipe is made from sheet stock which is delivered to the factory in strips twelve to twenty feet long and twelve to fifteen inches wide. These strips are welded into long strips, then wound on wooden

reels, which hold about six tons of the completed strips. From the reels the strips are fed to the pipe forming machinery, where it is made into pipe shape and cut to any desired length, usually twenty feet.

Street Railway Maintenance Welding, by Joseph B. Kimmel, Welding and Cutting Supervisor, Milwaukee Electric Railway & Light Company.—The selection and training of operators is apt to be one of the most difficult problems of the welding supervisor for any public service corporation, because the necessity for keeping down labor costs means that it is necessary to develop operators from unskilled workmen. In spite of this difficulty the use of the process has been so successful that the department has grown from one to twenty-five operators since 1919. There is apparently no limit to the number of applications to repair work. Rail bonding is a production job on which the torch is used extensively. Gas welding is very satisfactory for this work, because of the uniformity of the joints, and the smoothness of the operation. Service and repairs on equipment is a matter of considerable importance to the large user, so it is advisable to depend upon a single source of supply when one is found that can be depended upon to give a satisfactory type of service.

Pipe Line Welding from a Contractor's Point of View, by L. A. Kelley, Kelley, Dempsey & Co.—This paper is reprinted in full on another page, so it will not be abstracted here.

The Interdependence of the Oxygen Producer and the Apparatus Manufacturer, by W. A. Slack, President, Torchweld Equipment Co.—The welding industry should not be regarded as a game, but as something to be built up. Salesmen should first be taught to be more accurate in their statements regarding gases. More publicity is needed for the conditions under which gas and apparatus should be handled. Pure gases and properly constructed apparatus will reduce operating and maintenance costs. Both are necessary. The cutting torch is a wonderful tool for reducing costs in industry. The use of high grade fluxes should be encouraged. Prices should be made as low as possible, with fair profit, and maintained. All members of the industry must work together to boost it and keep it on a high level.

In addition to these papers, and committee reports, two moving pictures were shown at the general session on Thursday afternoon. One of these, "Oxygen, the Wonder Worker," prepared by the Bureau of Mines, showed the production methods used in oxygen and acetylene plants, the principles of the oxy-acetylene cutting torches, and their operation, and a number of important applications of the oxy-acetylene process. The other picture, "From Mine to Welding Rod," showed the many processes involved in the manufacture of rods for gas and electric welding, and how these processes affect the welding qualities of the metal. This picture was prepared by the Chicago Steel & Wire Co., and was introduced by Mr. Holt of that company, who gave a short descriptive talk to make the theme of the picture more clear to the spectators.

"SHEET METAL WELDING BY THE OXY-ACETYLENE PROCESS." A NEW BOOK

In the text books and manuals published for the benefit of sheet metal workers there is a noticeable lack of information on the subject of welding, and in the text books which have been printed on the subject of welding itself the amount of space devoted to the application of the process to sheet metal work has necessarily been limited. Consequently there is a big demand for a single book treating the special subject of welding sheet metal. The Linde Air Products Co., of New York, have just finished the publication of such a book which contains about two hundred and sixty pages of information and illustrations of this special kind of welding. There are 187 photographs and diagrams in the book, which is printed on a good quality paper and carries marginal notes to make it easy to locate the information on separate topics. The Table of Contents is as follows:

Oxy-Acetylene Welding in the Sheet Metal Field.
Patterns and Lay-Out Methods.
Preparation of Material and Assembly.
Jigs and Fixtures.
Welding Particles for Sheet Steel.
Welding Non-Ferrous Metals and Alloys.
Testing Welds.
Finishing.
Various Applications of Welding in Sheet Metal Work.
Welded Tanks.
Utensils, Metal Furniture, Doors and Sash.
Welding in the Automotive Industry.
Steel Barrels.
The Use of the Oxy-Acetylene Blowpipe for Heating.
Equipment for Sheet Metal Welding.
Shop Organization.
Cost Records and Cost Estimating.

Where welding is being done those responsible for welding practices should be informed on the several distinctive features involved in obtaining welded joints of high quality, and in the case of sheet metal this information is certainly available in the complete instructive book described above.

DEMAND FOR WELDERS IN CLEVELAND

During the last twelve months the demand for men trained in the trade school shows that the largest increase in call has come for electric arc welding operators, according to reports compiled by the trade school division of the Cleveland Y. M. C. A. School of Technology.

The demand for welding operators has shown a three hundred per cent increase in the Cleveland district alone, according to C. V. Thomas, director of the schools. At the same time it is said that the popularity of this course has shown a corresponding increase.

"Much of the demand may be attributed to the rapid increase which has come in the application of electric arc welding both on production work and in commercial fields," says Mr. Thomas. "Aside from this fact that electric arc welding has been successfully applied to commercial structural work, has caused a tremendous interest in this trade.

"The Y trade school, cooperating with the Lincoln Electric Company, has done more to make possible the training of welding operators than has any other like school in the country dealing with part time adult education. The men taking this course not only are given an opportunity to do practical work at the school, but go further and are given production experience at the Lincoln Electric Company plant."

J. F. LINCOLN ON LONG TOUR

Mr. J. F. Lincoln, executive vice-president of the Lincoln Electric Company of Cleveland, has just started on a six weeks' trip which will take him to all of the important industrial territories in the country. He will not only confer with distributors of the Lincoln electric motors and Stable-Arc welders, but will make a study of business conditions in the East, South, West Coast and the Middle West before returning to Cleveland.

Advance arrangements have been made by which Mr. Lincoln will address a large number of meetings of the firm's sales agencies and technical societies interested in the rapid progress which has recently been made in the application of electric arc welding to production and in the structural field. Both in Los Angeles and San Francisco he has been asked to address special meetings of the local chapters of the American Welding Society.

The trip will take Mr. Lincoln to New York City, important points in North Carolina, New Orleans, Houston, Texas, Fort Worth, Oklahoma City, El Paso, Phoenix, Los Angeles, San Francisco, Portland, Ore., Seattle, Duluth, Minn., Kansas City, Chicago, and other large centers.

Welding Rails and Manganese Steel*

Recommended Standards of Practice Relating to Rail Joints and Building Up of Worn Tracks

EARLY in 1925 the Committee on Way Matters of the American Electric Railway Engineering Association sent out a very complete question sheet covering all applications of welding to street railway work. Two of the subjects assigned to the committee for investigation were directly concerned with welding, so it was desirable to secure as much data as possible on the subject. The subject of arc welding for repairs to rails and manganese steel had not previously been considered as an independent subject, although previous committees had studied and discussed certain details of the problems involved in welding rail joints, and it was desired to define clearly the existing practices throughout the country. In its report before the convention of the association held at Atlantic City last October the committee presented the following remarks:

The questionnaire was followed up with individual appeals that netted some additional information which the Committee was able to use. As the result of the work done this year there has been compiled a set of rules representing what we believe to be the most accepted modern practice in arc welding of railway track structures, and which, if followed, should result in the best welds obtainable under the present state of the art. They are submitted only for information at this time.

Rules To Be Observed in Arc Welding

(Submitted Only for Information)

Rail Joint Welding:

It is important that the joint be assembled so that there is no opening or gap at the point. The rail ends should be milled square laterally and vertically but the base should be slightly undercut. The rails and plates should be free from rust, scale and all other foreign matter. The joint plates should be rolled and of medium-carbon content having the maximum obtainable contact in the fishing surfaces. The joints, when possible, should be assembled so as to bring the rail ends under moderate compression and a practical way of accomplishing this is by the use of drift pins.

Low-carbon welding rods should always be used and care taken to provide rods of correct size for the various processes and work at hand. Apply plenty of weld metal, which must always be kept as clean as possible, to the proper location and use a minimum amount of heat at all times. Weld each joint as promptly as possible after starting the welding operation. Use plates that are best suited for the welding and which make the welding operation as easy and simple for the welder as possible. There are three accepted methods of arc welding rail joints as follows:

1. The "metallic" method where the welding rods are used as one of the electrodes.
2. The "hand feed" carbon arc process where the welder holds the rod in one hand and the carbon in the other and feeds the rod into the crater of the arc as required.
3. The "rod laid in place" method where the rod is welded after it has been laid in place to bring the weld metal in the correct location.

Welding Cupped Rail Ends:

Figs. 1 and 2 show wrong and correct methods for applying weld metal to cupped rails.

Use only high carbon rods which comply with the American Welding Society specification. Start the weld on the gage line of the rail and run the bead the length of the cup, then across the rail at an angle of forty-five (45) deg.; then along the back of the head to a point which will enable you to cross the head of the rail at the same angle to the starting point. Continue to weld in a circular manner finishing in the center of the cup. This procedure will avoid nicking the rail with the arc which causes many failures. Keep the surface clean of oxides and all foreign matter at all times. Brush the weld frequently with a stiff wire brush. Lay the beads close together cutting into the previous bead about one-third of its width to assure a smooth solid weld. Hammering the weld metal while hot will assist in removing the scale and relieve the weld of stresses. Where deep cups or broken ends are replaced it is well to soft steel at first and then cover this metal with a good layer of high carbon steel to assure good wearing qualities.

Welding Manganese Steel:

Great care should be exercised to avoid overheating the casting and, if possible, the welder should work on several different pieces, alternating so as to hold down the heat on each piece to a minimum. Quenching is considered good practice. The weld metal should be applied slowly and hammered as often as possible while the metal is hot. The floors or risers should always be built up first to assure the correct wheel bearing condition on the surfaces. High-carbon rods will make a satisfactory weld on manganese steel when applied properly. Rods of from ninety-five hundredths (0.95) to one and one-tenth (1.10) carbon usually work best. Grind all such welds immediately in order to relieve the weld and the casting of all the unnecessary stresses. Use short arcs and low voltage when possible to assist in holding down the heat to a minimum.

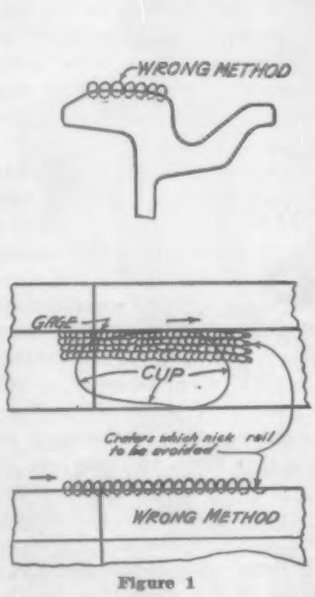


Figure 1

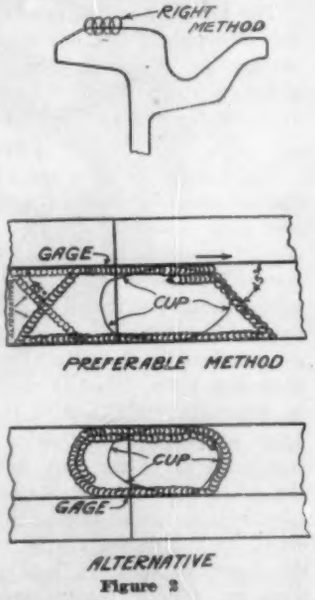


Figure 2

The use of eleven (11) per cent to fourteen (14) per cent rolled manganese steel welding rods has proven quite successful for welding manganese castings, the rods being applied in the same manner as the high carbon rods. The practice of welding slowly, quenching the metal, hammering while hot and grinding immediately are rules which should be observed at all times.

Polarity:

When arc welding rail joints with both the hand feed and

*Abstract from Report of Committee on Way Matters, American Electric Railway Engineering Association, presented at annual Convention at Atlantic City, N. J., October 1925.

the rod-laid-in-place methods it is desirable to use the carbon as the negative electrode. For metallic welding, except in the case of welding upper seams of rail joints, where the rod should be negative, it is optional as to the electrode being positive or negative. However, the use of the rod as a positive electrode seems to be given the preference and is quite necessary when welding manganese steel. Cupped rail welding is best accomplished by the use of the rod as the positive electrode. This enables the welders to use the resistance welders in the regular way but usually requires changing the polarity on dynamotors and motor-generators which are normally connected to make the electrode negative.

Conclusion

It is believed that a substantial start has been made in our investigation of this subject and that the subject is an extremely important one to electric railway engineers and justifies further study. The rules given should, if followed, aid in standardizing arc welding practices and produce much better results than are now being obtained in many cases.

Recommendations

(1) That the subject be referred to the ensuing committee for further study.

(2) That the rules submitted be printed in pamphlet form and sent to all member companies for distribution in their Maintenance of Way Departments.

Subject No. 6-B—Welding Wire Specifications
Previous Consideration of Subject

The 1924 committee gave considerable attention to this subject although it had not been officially assigned to it for investigation. Consequently, no recommendations were made, although considerable information was collected which was available for use by the 1925 committee.

Progress

The committee sent out a questionnaire in May, 1925, but the information obtained was so limited that the committee was able to make but little use of it. The subject was given careful thought and a great deal of discussion at the various committee meetings. The information obtained by the committee showed that the only recognized standard specifications for welding wire are those of the American Welding Society as contained in their Bulletin No. 2, Welding Wire Specifications and Folio, dated December, 1921 (given herewith in full in Appendix "B"), and in the absence of better information upon which your committee might base the preparation of specifications of its own, it feels that these specifications of the American Welding Society represent the best commercial specifications obtainable at this time. Attention is specifically called to the distinction between specifications and folios in the American Welding Society Bulletin referred to. Specifications are definite recommendations of the committee which, in accordance with the ruling of the American Bureau of Welding, are to be valid for the period of one year. Folios contain information which the committee offers solely as a guide for the selection of welding material of the nature described. An accurate understanding of this distinction is essential to a proper interpretation of the American Welding Society specifications and is clearly set forth in the Bulletin. Your committee, however, felt that it was desirable to emphasize it at this time.

We have voted, however, to change the length of rod from fourteen (14) in. as given in Sec. 10 of American Welding Society specifications for Iron and Steel Bare Electrodes, to thirty-six (36) in. as the standard length for all high-carbon welding rods, and twenty-four (24) in. in the case of all other rods, except in special cases which limited the length of the rods.

Conclusion

We believe the matter should be given further study and that the ensuing committee should continue the work which has been started this year in an effort to secure the necessary data that would enable them to prepare a satisfactory specification for wire for railway track welding purposes. We therefore make the following

Recommendation

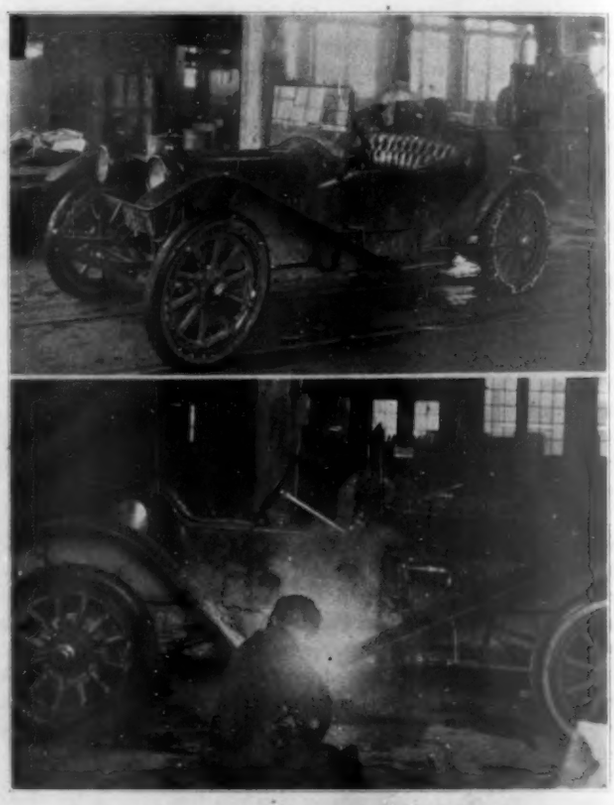
(1) That the study of this subject be continued by the ensuing committee.

(2) That the use of the Welding Wire Specifications and Folios of the American Welding Society be recommended until such time as our association is able to prepare specifications of its own.

G-E WELDERS REPAIR COMPOSITE AUTO

An interesting welding operation was performed on an unusual automobile by General Electric welders at Schenectady recently. The car, a 1913 model Regal, is a third-hand machine and includes parts from a number of standard makes of automobile, including the following:

Wheels	Cadillac, 1911
Engine	Grant 6, 1916
Transmission and differential	Cadillac, 1911
Upholstery	Cadillac, 1911
Radiator	Speedwell, 1910
Headlights	Stutz, 1912



Above—Composite Car
Below—Welding the Frame

Windshield	Scripps-Booth, 1915
Steering column	Maxwell Big 6
Steering wheel	Cadillac, 1925
Oiling system	Fiat, 1910
Ignition system	Bosch dual, from Rouraine 6, 1908
Starter	Grant, 1916
Horn	Packard, 1913
Carburetor	Marvel, from Buick, 1917
Connecting rod belts	Ford
King and tie rod bolts	Buick, 1917
Front hubcaps	Buick, 1917
Rear hubcaps	Cole 8, 1923

An Empress chassis is used, the lubricating system was bought new and installed and the following parts were hand-made: Mud

guards, dash and instrument board, crank, cone leather faced clutch and cutout. External brakes only are used, these being operated either by hand or foot by means of a set of rods.

Gas and spark are controlled by two universals, one inside the other. All forces are transmitted in a straight line, all control rods being straight and running at right angles, as it was necessary to shift all the control from left-hand drive (for which the motor was designed) to the right-hand drive with which the car is at present equipped.

The car is owned by a Ballston Spa. N. Y., garage and is used for towing. While in service in the Adirondacks, the frame channel on the right side, below the driver's seat, recently cracked from the bottom up for about two-thirds of the width of the channel. In order to get the car to the General Electric shops for welding, a temporary repair was made with angle iron bolted to the frame and the car was driven to Schenectady from Diamond Point, Lake George, under its own power.

Once in the shop, the frame was jacked up until the crack closed up tight. A single weld bead was then run along the entire length of the crack on the outside and bottom of the channel. A 3/16-inch steel plate, 8x2 in., was then welded over the crack. The complete repair was made in approximately 30 minutes.

HOLLUP ANNOUNCES NEW FACE SHIELD

The C. H. Hollup Corporation of 3333 W. 48th Place, Chicago, have developed and just placed on the market, a new face shield for electric welding operators. This new face shield, which is known as Catalog S-102, is made of fiber and the shape is such that the sides of the face and sides of the neck are fully protected. As will be noted from the illustration, the face shield is turned back on both sides and will cover the average operator as far back as one inch back of the ears. The face shield is also provided with a leather apron, which serves to protect the operator's hand and also his throat in case his shirt is left open in the hot weather. The face shield is also provided with a sight box which is designed to fit comfortably against the forehead and around the eyes and at the same time is closed on top so that sparks cannot drop in. Many face shields do not have a sight box of any kind but it has been found that they serve to eliminate reflected rays from the back. The glass holder is of pressed metal and is of a design which makes the changing of glass very convenient. With all of these new features the hand shield is very light in weight and well balanced.

New Hollup Face Shield—"Rex."

NEW "G. & G." WELDING REGULATOR

A short time ago Mr. P. M. Grant, of the G. & G. Brass Manufacturing Company, Chicago, Illinois, started to develop a new type of gas pressure regulator for the welding industry. Mr. Grant has been familiar with the principals of regulator construction for a great many years, in fact, ever since the early days of their manufacture in this country. His latest invention will be marketed in the welding industry by the name G. & G. The design of this new regulator is a complete departure from conventional methods of construction. There are two compartments in the regulator. One of these compartments contains the diaphragm and operating units and the other is the valve cylinder. These compartments are joined so as to form a channel through which a lever passes from the diaphragm to the valve stem on a fulcrum for operating the valve. The old reliable principle of leverage has been applied to this regulator, so as to give enormous power for shutting off and controlling the valve and thus eliminating irregularities in operation. Mr. Grant says this leverage control has resulted in unusual accuracy and sensitiveness in the regulator. The G. & G. regulators are also equipped with dirt collectors which allow easy cleaning of safety valves, which operate to shut off the high pressure gas and the cylinder immediately, in case the diaphragm is ruptured.

New "G and G" Welding Regulator

CLEVELAND SECTION, A. W. S., DISCUSSES CAST IRON

The January meeting of the Cleveland section of the American Welding Society was held as usual in the Cleveland Engineering Society rooms in the Hotel Winton, on Tuesday evening, January 19.

Preceding the meeting an enjoyable "Get-Acquainted" dinner was served in the main dining room of the Hotel, Mr. John H. Thornton, the chairman, acting as host.

The speaker for the evening was Mr. H. E. Winkleman of the Purox Co., who has had a great deal of practical experience in the welding of cast iron, and Mr. Winkleman also has an ex-

tensive knowledge of the theory involved. Mr. Winkleman feels that there is no difference in the welding between a heavy and a thin section of cast iron as far as the phenomena involved, the only difference being in the methods of pre-heating to handle expansion and contraction problems.

Precision welding with the Oxy-Acetylene torch, Mr. Winkleman contends, is a field that is almost untouched and should offer an opportunity for great development. Precision, needless to say, depends greatly upon the alignment, and the alignment of various pieces offer an interesting study. Over-heating the metal, according to Mr. Winkleman, is responsible to a great many failures in the process of cast iron welding, and he laid great stress upon the selection of the tip and contended that the smallest flame possible to attain fusion was the flame to use in making a successful cast iron weld.

Conservative use of flux was also recommended, the idea of adding flux by the handful should be discouraged.

In conclusion, Mr. Winkleman gave a very interesting review of the progress of the iron industry, starting with the famous Damascus steels and following in a highly interesting and constructive manner the progress made, up to the present time.

Following Mr. Winkleman's address the meeting was thrown open to discussion on the merits of Electric Arc welding of cast iron and Mr. Haas of the Una Welding and Bonding Co. gave a highly interesting talk on welding conditions in Germany immediately following the war, when economic pressure made necessary the salvaging of many cast iron parts. He rather favors the arc welding of cast iron because it is cheapest and believes that the carbon arc welding of cast iron should be used more, even though the pre-heating of the part to be welded is necessary.

Low carbon steel rods, according to Mr. Haas, made a weld that is highly satisfactory, especially if the object is pre-heated. He did, however, favor for "cold" welding of cast iron the use of nickel rods.

A NEW MATERIAL FOR MANGANESE WELDING

A new filler rod for manganese steel welding has recently been developed and put on the market under the trade name of WELDMACO. It is a product of a recently organized concern, known as the Welding Materials Company, 1113 New Orleans Bank Building, New Orleans, La. The officials of the new company are Mr. P. W. Wood and Mr. E. J. Shuler.

Mr. Shuler, a metallurgical engineer of the New Orleans Public Service Corporation, has devoted several years to the investigation of the subject of manganese welding for the purpose of reclaiming worn and broken manganese frogs, crossings and switches on the tracks of the New Orleans railways. He has had at his disposal every facility for this work, including a very complete laboratory and the services of several expert welders.

In his investigation Mr. Shuler found that successful welding of manganese offered a number of complications. There was difficulty encountered in the danger of changing the structure of the manganese workpiece, by the amplification of excessive heat to such a degree that while the seam could be placed on the manganese casting, the resulting job showed failures which undid all the effort expended on the work. Another difficulty experienced was found to lie in the excessive sputtering during welding, which made it difficult for the welder to maintain an arc of the proper length. Blow holes and craters were formed and penetration was hard to get.

The experiments were, therefore, designed to produce a welding rod which would reduce, and if possible eliminate these various difficulties. The manufacturers of the Weldmaco rod state by incorporating certain ingredients in the cutting of the rod they have succeeded in eliminating this sputtering and produced a quiet arc so that the rod flows as easily as a low carbon rod and makes a smooth surfaced, solid seam, entirely free from blow holes or cracks.

Quite a little attention was also given to the matter of arc manipulation when depositing manganese, so as to develop a method of keeping the work piece as cool as possible and manipulating the arc in such a way as to allow the escape of harmful gases, which otherwise would tend to injure the weld. The standard procedure finally adopted was that of making a deposit in the form of a series of connected, overlapping half moons working the arc in a half circular motion from one edge of the seam to the other, the loop of circles pointing away from the operator and the points toward him. The finished seam expands from one-half to five-eighths inch in width. The quenching of the metal is accomplished by saturating the wire brush with water and scrubbing the seam after not more than two inches of length have been deposited.

OXYGEN PLANT ENTERTAINS LOCAL PURCHASING AGENTS AT NOON LUNCHEON

More than 40 members of the Houston Purchasing Agents association were the guests at a luncheon given by the Magnolia Gas Products Company at the plant in North Houston as acceptance to an invitation extended the local purchasing agents to visit and inspect the factory and offices of the company.

The body of purchasing agents headed by J. E. Nolen, purchasing agent for The Texas company, and one of the directors of the Houston association, was met by officials of the company, headed by E. L. Wilkins, sales representative for the company. Following the luncheon served in the dining room of the company, the purchasing agents were conducted through the various divisions of the Magnolia Gas Products plant where they were enlightened on the making of acetylene gas and welding equipment including the process of separation of hydrogen and oxygen from distilled water for the purpose of creating the gas. It was in this explanation that the body was informed of the fact that this company is the largest single consumer of electricity in Houston.

The visitors, following a trip through the plant of the Magnolia Gas Products Company, were taken through the South Texas Cotton Seed Oil Company plant, that plant being the parent company of Magnolia Gas Products, where they saw step by step the process of turning out the finished peanut oil product at a rate of more than 800 gallons per hour.

R. F. Crow, chairman of the board of directors of the South Texas Cotton Seed Oil Company, welcomed the association members in a short talk after the luncheon. Nolen, of the purchasing agents' group, spoke in behalf of the guests, thanking the company for its hospitable offering.

At a short business meeting of the association in the dining hall of the company, J. M. Barineau of the International Petroleum Company, was unanimously elected a member of the Houston association of purchasing agents. The names of O. P. Williams, purchasing agent for the Houston Pipe Line Company, E. W. Gross, Magnolia Petroleum Company, Beaumont, and H. F. Hoffmaster Jr., Swiftsure Petroleum, Houston, were received for consideration to be voted on at the next meeting to be held Monday, December 14.

Members of the association present were introduced to officials of the company of Paul Reid, association secretary, after which individual guests of several of the members were introduced to the entire body.

Built 1910—Hibbard Spencer Bartlett Store Building—Demolished 1926

Making Way for Progress

Cutting Torch Speeds Up the Work of Tearing Down Old Buildings to Make Room for Improvements

STATE STREET again forges to the front in the cutting and demolition of buildings which are to make way for new improvements. Just recently the old Singer building, State Street, Chicago, had its cast iron front altered with the oxy-acetylene torch, in order to make way for a new and larger building. This interesting piece of work was described in the November, 1925, issue of *The Welding Engineer*.

This time it is the Hibbard-Spencer-Bartlett & Company store building which has been completely demolished. The work was begun soon enough before the Wacker Drive improvement reached State Street and the River so that the building would be completely out of the way, thus enabling the workmen to complete the river link to the bridge at Michigan Boulevard. Wacker Drive, with its upper and lower deck, is replacing the old South Water Street market district, and it has been necessary to remove every building along the way so that this wonderful new improvement could be completed. Although the Hibbard-Spencer-Bartlett & Company store building, at State Street and the River, was a comparatively new building, being built in 1910 on extremely modern lines, it had to go, along with the tumble down buildings and shacks which comprised this unsightly district.

This building was still good for many years of service, as was shown when the huge walls and beams were cut and torn apart. The photographs reproduced here will show you, to a certain extent, the magnitude of this piece of work. All of the immense beams were dismantled and carried away to be used in other buildings now under construction. Here the oxy-acetylene torch came into play, for it was used to remove or cut off all of the rivet-heads so that the rivets could be drifted out and the beams removed in good condition.

The Newman Company, Chicago, had complete charge of the wrecking of this large building. They sub-contracted the oxy-acetylene cutting work to Louis L. Tatter of the Ideal Welding Company, also of Chicago. Mr. Tatter is always called upon by the Newman Company when their work requires the use of the oxy-acetylene cutting process.

One can readily understand what an enormous task this was by studying the reproduction of the building. This building was exactly one block long and extended from South Water Street north to the Chicago River. Some of the photographs show cutting on large ventilating shafts, cutting on boiler connections and cutting of rivet-heads. Unfortunately, however, it was almost impossible to get clear photographs of some of the heavy work, as it was done in inaccessible places where the camera could not function properly. Weather conditions, while the work was being carried on, also prevented very much good photographic work.

One of the photographs shows the skull cracker which was used to batter down the floors and whatever else might be in the way. When it came to the heavy beams, however, it was necessary to use the torch. The huge girders were surrounded by brick and mortar, fire brick and cement to the thickness of about two feet on each side. The thick covering was removed from the girders and beams by means of a compressed air chipping hammer. The hammer was also used to break away the cement floors surrounding the base of the beams, so that the torch operator could get to work on the rivet-heads. After the debris had been cleared away the torch operator started in and in a few minutes had cut all of the rivet-heads. In the meantime the wrecking crew had moved on to the next girder and removed its covering so that he could start in cutting the rivet-heads there. The torch operator followed closely on the heels of the wrecking crew, going from girder to girder until every rivet had been cut off and drifted out on the entire floor.

Large derricks and hoists were used to remove the metal after it had been cut into suitable sections. The useful members were carried away intact and in good condition ready for use on other buildings now under construction. The scrap, however, was sold as junk. It consisted of lighter metals, such as sections of the stack, small parts of the iron stairways, fire escapes and other metal parts which were not valuable enough to be taken apart carefully. Mr. Tatter has estimated that approximately 100,000 tons of metal were removed from this structure.

This is one of the most striking instances which has recently come to our attention, where the cutting torch has played such an important part in the progress and development of Chicago.

Left—Wrecking the Second Floor. Center—Cutting Rivets. Right—Close up Showing How Torch Operator Removed Rivet Heads Allowing Beams to be Removed in Good Condition.

Without it the work would have been greatly retarded and relief of the traffic congestion would also have been terribly delayed. The new Wacker Drive, aside from beautifying Chicago, is also intended to greatly help traffic conditions by opening up a great new artery for trucks and pleasure vehicles.

However, one can scarcely walk the streets of Chicago without being stopped by large crowds who are standing with their mouths open watching an oxy-acetylene cutting torch in operation. It is impossible to get away from it. Over on Clark Street a crowd of people were looking up at a building which was located on the corner. Next to it a building had just been removed and evidently alterations in the iron work were necessary. Quite a crowd had gathered on the sidewalk and were looking intently, with eyes focused at about the third floor of the building. Upon stopping to find out what they were watching we noticed the blue cone of the oxy-acetylene torch and then the flame and sparks as the torch cut through from the inside of the building and showered molten metal out of the side of the building. While driving down Michigan Boulevard the same thing happened, and, in fact, in a city like Chicago, where the old is always giving way to the new, especially in the building and construction field, the oxy-acetylene cutting torch is always in evidence.

Wrecking Hibbard Spencer Bartlett Store Building

LINDE COMPANY COMBINES PUBLICATIONS

For several years the Linde Apparatus Company has been publishing, for the benefit of its customers, a monthly house organ called Oxy-Acetylene Tips, and about a year ago started another publication of this nature called The Linde Oxwelder. The purpose of the first publication has been to present to their customers ideas which they might use to make Linde products of greater help and value. The Linde Oxwelder was established to tell customers how to weld, how to take care of their equipment and how to increase the usefulness of oxwelding. It has been developed that there has been so great a demand for both of these magazines by the same concern that it was thought advisable to combine them into one publication, which is now known as "Oxy-Acetylene Tips for the Linde Oxwelder."

The scope of the new house organ is best described by quoting the following from an editorial in the first issue of the combination: "For the executive it will carry articles describing how oxwelding has penetrated entire industries. For the engineer it will have data on the strength of welds and design of joints. For the operating superintendent it will have articles on welding in production and of procedure control. For the studious welders it will have articles about work notable for size, ingenuity or novelty. For the plant welder or beginner it will describe the technique of welding and care of equipment."

The distribution of this magazine, which is noteworthy for the high quality of the information contained in it, is a valuable contribution to the educational work which is being done and which must continue to be done to assist in the development and extension of the acetylene industry.

GIVES WELDING INFORMATION TO WIRE SALESMEN

In order to give all of the salesmen in their organization a more intimate knowledge of the welding processes, The Steel Sales Corporation, of Chicago, sales representatives for a number of large mills, invited Mr. W. A. Slack, President of the Torchweld Equipment Company, Chicago, to address one of the meetings of their salesmen. On February 6th Mr. Slack met this group and outlined for them the principles and application of gas and electric welding. A week later the same group was invited to the factory of The Torchweld Equipment Company to witness demonstrations of welding, so that they might become familiar with some of the elementary principles of the operations. The Steel Sales Corporation have a large sales force, some of whom specialize on welding wire and this program of instructing all of the sales force is expected to make possible a better service to all of their customers.

CURRENT PAPERS OF THE AMERICAN WELDING SOCIETY

There are a number of interesting and instructive papers in the current programs of local sections of The American Welding Society. At the meeting of the Buffalo Section, on January 26th, Mr. R. E. Kinkead read a paper on the subject of "Gold in the Welding Processes." Mr. A. V. Harris of The Haynes Stellite Company is scheduled to read a paper before the Boston Section on February 19th, the subject being "Stellite Surfacing, or Stelliteing." On February 11th, J. T. Lincoln of the Lincoln Electric Co., read a paper on "The Use of the Arc Welder as a Manufacturing Tool," before the Los Angeles Section. Talks were also prepared for this meeting by Mr. C. R. Mott, Mr. V. Simmons and Mr. J. Quinn.

STEEL SALES BUYS UNION DRAWN STEEL CO. STOCKS

January 1, 1926, Steel Sales Corporation purchased the entire Chicago stocks of Union Drawn Steel Company who have discontinued the operation of their Chicago warehouse.

In the future, stock shipments of Union Drawn steels may be obtained from Steel Sales Corporation, Chicago, whose former extensive stock of cold drawn steel, thus augmented, is now the largest warehouse stock of cold drawn steel in the Middle West, comprising all commercial sizes and shapes.

Quantity stocks of all commercial sizes of screw stock, shafting, rounds, shapes, S.A.E. 1020, S.A.E. 2320, cone steel and .40 to .50 carbon are maintained in Chicago for immediate shipment.

PHILLIPS-LAFFITTE CO. INTRODUCES "SUPER-FLUX"

The Phillips-Laffitte Company, Philadelphia, Pa., have been known for a number of years to the welding trade as manufacturers of the Laffitte welding blades, pressing blades, and welding and pressing powders. They have recently put on the market another invention of Mr. J. Laffitte, which carries the trade name "Super-Flux." This flux is recommended for welding cast iron, mild and cast steel, brass, copper, and bronze, and is stated by the makers to be particularly valuable in connection with the welding of dirty or rusted material, cleaning the metal and causing the melted material to flow easily under the flame. It is said that no special tools or equipment are needed and that no special preparation is necessary.

WIRE DISTRIBUTORS FIND MARKET GROWING

The Stulz-Stickles Company, Newark, N. J., are distributors of standards makes of welding rods. In the course of a recent interview they indicated that the improvements which were being made in the welding processes and the aggressive promotion work that has been done by those interested in the industry promises to increase the demand for good welding wire, a demand which they are trying to meet by keeping a complete line of filler material and controlling the source of supplies, so as to be sure that the quality of their product remains uniform.

A VALUABLE BOOK FOR GAS WELDERS

Under the title, "Engineering and Management Phases of Oxweld Construction," the Linde Air Products Company, of New York, have published a sixty-four-page book which comprises a series of recently published articles and addresses reprinted from engineering periodicals. The purpose of this book is to cover the whole range of welding by the selection of articles which are devoted to special subjects. The list of the topics covered in these papers is as follows:

Selection of Qualified Welders.
High Strength Welds.
Welding of Carbon and Alloy Steel Tubing for Aircraft.
Design of Joints.
Oxy-Acetylene Cutting of Structural Steel.
Importance of Managerial Understanding of Welding.
Testing the Finished Weld.
Gas Welding of Power Plant Piping.
A Plant for Oxwelding Vessels of Thin Plate.
Pipe Steel Shipped Flat, Then Rolled and Welded.
Welding Heavy Plate.
Welded Pressure Vessels.

ACME ACETYLENE PLANT NOW IN OPERATION

The new acetylene compressing plant of the Acme Oxy-Acetylene Company, which was erected last year at East Chicago, Indiana, is now in regular operation. At present the generating apparatus consists of one 1,000 pound generator delivering acetylene to a gasometer of 5,000 cubic feet capacity. The charging room has a capacity of 120 cylinders. The company is using new cylinders with a monolithic filler, manufactured by the Keith Dunham Company. Mr. Findlay, proprietor of the company, states that his plant has been operating at full capacity ever since the first day.

A FULL LINE OF PROTECTIVE EQUIPMENT

The Safety Equipment Service Company, of Cleveland, Ohio, specializes in supply safety equipment of all kinds to industrial plants. The many hazards in the metal working and other trades, which result in a great variety of injuries when not provided for, are met by goggles, gloves, helmets, aprons, leggings, etc. "Each item in our line," says Mr. B. W. Nutt, president of the company, "is made for a particular purpose and has been developed as a result of a desire to remove the danger from some particular operation." The Cleveland concern is well known to the welding trade as a source of supply for gas and arc welding goggles, helmets, etc.

WELDING ON PEGASUS

A Letter From a Welder to His Friend

Dear Neubauer:

This is the first opportunity I have had to write you since I was hit upon the head with a piece of petrified wood in Los Angeles.

I had intended to take a vacation and rest up a bit after my strenuous trip, but the Boss dashes down to Pershing Sq., where I was feeding the pigeons, and begged me to help him out.

It was a very important job he said, with just a spice of danger attached. He said there was no one west of the Mississippi who could do the job but me. Well, you know me Paul, I am the last one to ever boast of my many and varied accomplishments, but, after I saw the job, two days later, I'll say there's no one else either side of the Mississippi that could have done it.

Ready for the Next Job

Well, as I was saying, the Boss was on the point of breaking down in a fit of crying, and really, you know how soft hearted I am, I said, "All right."

So I went over to Boos Bros. for a bite of lunch and to discuss the job, but a crowd of middle-westerners were having lunch and I could not hear a word, so we returned to the park. The Boss pulls out a blue-print and I oiled my polyphase duplex and we had the material list about finished when a policeman stops and glares at us rather suspiciously. I warned the Boss to put the blue-print in his pocket, because the police here have no technical training, and might easily have mistaken it for the Constitution of the U. S., and shove us in jail as they did U. Sinclair a few years ago.

There was no time to be lost. The Boss phoned Sacramento and had a talk to the Governor, and in a few minutes I was in his private car and dashing up the coast to San Francisco.

This caused quite a bit of bad feeling in Los Angeles, because the Chamber of Commerce came down to see me off, and to present me with an illuminated address, but they were a few minutes late and were naturally a bit peeved at missing me.

My trip up the coast was one triumphal procession. My fame as a Welder had preceded me, and at times I had to call out the National Guard to force a path thro' the autograph hunters.

It was not until we reached Fresno that we had any serious difficulty with my host of admirers. They completely blocked the road, and the troops made no effort to disperse them, in fact, they seemed to encourage them. It was of course, an annoying delay, but still I could hardly repress a certain sense of pride.

The General in charge of the Pacific Coast came up and practically admitted that the situation had gone beyond his control. He begged that I use my influence with the crowd, because, if the Japs should land while the army was in this state of confusion, the country was lost. This of course would not affect you and Holslag, living in New Jersey.

Well, I spoke for two hours, signed autographs and posed for photos. Really, I shall travel incognito in the future.

At Frisco, matters were as bad if not worse. The local authorities drove us to the Civic Center, where I was officially welcomed. Then followed a review of the Boy Scouts and a banquet at the Cliff House. Mr. Brown of Brown Bros., welcomed me on behalf of the Welding Profession. I then spoke rather informally of my success in the welding art, and defined the chief and outstanding causes for the same. I tried to give some of the credit to B. L. T. of Chicago, but the crowd would not hear it. Mr. Nobel Wright insisted that it was purely a personal achievement and a remarkable, if not extraordinary exhibition of individual effort.

We then boarded a launch and proceeded to the job, and I found the most intricate piece of engineering imaginable. A battle ship on entering Frisco Bay in the fog ran into the Golden Gate and broke off several of the hinges. I promised not to say anything about the fog, but, one must be accurate when one makes a scientific statement.

One side of the gate had fallen across and completely blocked the narrow entrance to the bay. Of course all shipping inside the bay could not get out, and all shipping outside the bay could not come in.

And to make matters worse, there were 17 liners loaded with Japanese immigrants unable to land. The steamship authorities threatened to take the immigrants to Los Angeles, and the people of Frisco held a protest parade to prevent them from doing so.

Of course you know that the Golden Gate is not really gold at all. It is merely manganese bronze, and as the welding of manganese bronze in an "over-head" position is quite easy for a really first class man, I wasted little time on that. My big problem was to raise the gate to its original position. In order to do this I towed an oil tanker beneath the fallen gate and tried to jack it up, but we sunk the tanker. Then I phoned the Sec't of the Navy, and he placed the entire Pacific Fleet at my disposal.

I needed however only two battle-ships, which I placed one on either side of the gate. I then ran a cable from mast to mast. It was now merely a matter of attaching a block and fall to the cable and raising the gate. But on trying this I almost capsized the ships. It was then necessary to anchor the ships with cables to prevent their capsizing.

So, I anchored the first cable around the City Hall in Oakland, and on the other side the nearest land was the Hawaiian Islands, to which I securely fastened the second cable. From now on the job proceeded rapidly.

Of course all the welding was done on a float and as the waves rose and fell from 8 to 20 feet, you can readily realize that in order to maintain a constant 18 volt arc, (my standard) a man must, as they say in the west, "know his oats."

An hour later I boarded the launch and gave the signal to swing the gate landward—the job was a success. I returned to Frisco amid the cheers and salutes of the fleet, which had formed a lane thro' which we passed. A holiday had been declared and I spent the balance of the day acknowledging the plaudits of a grateful public.

My best regards to Mrs. Neubauer and say that I am anxiously awaiting an invitation to dinner when duty next calls me East.

Yours to the last electrode,

EL SOLDANDO.

Guaranteed Welding Steels

Success or failure in electric welding is 90% due to the welding materials.

GUARANTEED

DEPENDABLE

The best materials are the best insurance of good welds.

"Indianapolis" {Flux-coated Heat-treated} Electrodes

Identified by the Package

Electric Railways Have Used Over 20 Million---

"Indianapolis" {Flux-coated Heat-treated} Electrodes—

in Reclamation, Repair and Construction Welding.

"Indianapolis" stands as the PIONEER, the ORIGINATOR, the DEVELOPER of the art of applied

"METAL-ARC-WELDING" and PRODUCERS of the ORIGINAL "FLUXATED METAL ELECTRODES"

"Indianapolis" has SPECIALIZED **for 15 years** on a Special Product for a SPECIFIC PURPOSE.

"FLUXATING and HEAT-TREATING, increases the PHYSICAL 50% to 100% by test.

"THE PROVING-GROUND, the most exacting and severe,
"A Thousand and fifty Street Rys.
"This Super-Product

"Indianapolis" {Flux-coated Heat-treated} Electrodes

is now also used extensively by Rolling Mills, Well Drillers, Dredgers, etc. demanding SUPER-SERVICE.

"THE ONLY SOURCE"

Shipped direct to USERS only, THEREBY, **guaranteed** UNIFORM, SUITABLE, DEPENDABLE insuring RESULTS.

1911—THEN AND NOW—1926

During the fifteen (15) years elapsing, since the application of Metal Electrode, welding, by The Indianapolis Switch & Frog Co., exclusively for Electric Railways (limited field) . . . . . the practice has been taken up by the Metal Industry, Universally creating a broad and diversified application of Commercial WELDING . . . . . to serve which we offer.

GENERAL WELDERS' SUPPLIES AND MATERIALS

WIRE AND RODS

Alloy Brass | Cast Iron Manganese | Iron Low Carbon Steel | Medium Carbon Steel Semi-high Carbon | High Carbon Steel Super-high Carbon Steel

ALSO

Carbons | Gloves | Helmets | Lenses | Flexible Cable

The Indianapolis Switch & Frog Co.

SPRINGFIELD, OHIO

BOSTON ST. LOUIS LOS ANGELES SAN FRANCISCO

News Of The Welding Trade

It is reported that the Liberty Welding and Manufacturing Company, located at 4200 Grand River Avenue, Detroit, Mich., is planning to complete a one-story addition. The president of the company is Mr. J. K. Smith.

The Schweitzer Brothers Company, of Cincinnati, have recently moved their welding and blacksmithing business to a new location at Front and Ludlow streets.

The Branch Office of the Chicago Steel & Wire Company, Chicago, Ill., has been established in Room 305, Euclid Sixty-first Building, Cleveland, Ohio. Mr. R. R. Applegate, formerly an engineer of the Rail Welding and Bonding Company, who has conducted numerous welding tests for the United States Navy, is in charge of the new office. The company has made arrangements for carrying a warehouse stock of their welding wire in the city.

Morris Taylor, welding expert for the Lincoln Electric Company, of Cleveland, has just left for San Francisco where he will serve as consulting engineer on a large welding project which is expected to require about a year's time.

The 1926 convention of the Master Boiler Makers will be held at the Hotel Statler, Buffalo, N. Y., on May 25th to 28th, inclusive.

The San Francisco office of the Commercial Acetylene Supply Company has removed from 553 Monadnock Building to 417 Market Street.

Mr. J. B. Green, president of the Chicago Steel and Wire Company, has been touring the Southeast for several weeks and is expected to return about March 1st.

At the recent auto show in Chicago, the Imperial Brass Manufacturing Company, of Chicago, had an exhibit at which their line of automobile accessories was displayed. They also took occasion to display their full line of acetylene welding and cutting equipment, which is a popular one in the automotive trade.

Currett Welding Literature

CUTTING CAST IRON WITH THE TORCH, by A. Boutte—Although it has been generally recognized that the cutting of cast iron could not be cut with the same precision and economy as in steel cutting, castings have been demolished with considerable success, and a fairly satisfactory technique established. Not being thoroughly in accord with prevailing American theories regarding the cutting of cast iron, a French manufacturer of apparatus has designed a special torch for this type of cutting. It differs radically in principle from steel cutting torches in that provision is made for supplying acetylene to the cutting jet of oxygen, for the purpose of preheating the cutting oxygen. This torch has been given a service trial in the reconstruction of railroad bridge, a job which was handled with great success, and demonstrated that with this special type of cast iron cutting torch it is possible to get faster work and clean straight cuts, the circular motion of the tip being eliminated. The gas consumption is higher than in steel cutting, however.—Revue de la Soudure Autogene, December, 1925.

OXY-ACETYLENE TIPS—Monthly publication of the Linde Air Products Co. In the February issue: Heat treatment with the oxy-acetylene flame, Salvaging abandoned trackage, Reconditioning river boats, Automobile mufflers better and more quickly made, Temporary Pipe Lines, Spending a dollar to save a fire, Oxwelding a cylinder block, Job card stands, getting carbon burning business, Care of blowpipe tips.

WELDING STEEL TUBING AND SHEET WITH CHROMIUM-MOLYBDENUM WELDING WIRE, by S. T. Sisco and H. W. Boulton—Weld has more desirable and uniform structure than low carbon welding wire. A soft area due to localized annealing is left near the weld. Heat treatment greatly improves this condition. The welding wire is difficult to work, but a skillful operator can produce a nearly perfect weld.—Acetylene Journal, January.

WELDING CAST ALUMINUM—Peculiarities of Aluminum; Preheating is essential; Expansion and contraction must be carefully considered; How to weld a crack in cast aluminum; Backing is often necessary; The puddle should be small and the metal well controlled.—Acetylene Journal, January.

OXY-ACETYLENE WELDING OF MONEL METAL CASTINGS—Success depends upon the ability of the welder to prevent the formation of blowholes and also cracks in the weld and the surrounding base metal. It is therefore necessary to give particular care to preheating and annealing. A drawn rod, free from any oxide coating, and a tip one size larger than for the same thickness of steel. Monel metal should be welded with a neutral flame, torch manipulation being much the same as in welding cast iron.—Welding Journal, London, January.

TESTING THE FINISHED WELD, by S. W. Miller—The testing of welds should be done in such a way as to show their resistance to stresses known to exist in service. Testing for finish and porosity can be done rapidly by visual inspection. Service tests are usually required to determine the resistance of a weld to corrosion. Test pieces should be broken in the weld so as to show the strength of the weld metal. The use of the strain gauge has recently been applied to large welded structures with interesting results—The Welding Journal, London, January.

ARC WELDING AS A MANUFACTURING PROCESS—Abstract of a review of some of the more important applications of the arc welding process, prepared for the recent fall meeting of the American Welding Society.—The Welding Journal, London, January.

EFFECT OF HEAT OF BRONZE WELDING ON CAST IRON PIPE, by A. R. Lytle—An investigation of the structural changes that occur in cast iron due to the heat of the application of bronze. Both sand cast and centrifugal cast pipe are included. It is concluded that neither cast iron nor bronze welding of the usual cast iron pipe has any detrimental effect on the structure of the base metal.—Journal of the A. W. S., January.

STRUCTURAL STEEL WELDING ON A COMMERCIAL BASIS, by H. P. Egan—Description of the steel building erected by the Morgan Engineering Company, with a discussion of the possibilities of extending the use of the electric arc for this class of work. A discussion of the paper by Mr. R. A. Storm, of the Morgan Engineering Company gives additional details.—Journal of the A. W. S., January.

DESIGN FOR ONX-ACETYLENE WELDING, by G. O. Carter—The first major principle for oxy-acetylene welding is that butt joints are much preferred to lap joints. Fillet welds should be balanced up with other welds or fastenings to prevent peeling. Important welds should be made from both sides whenever possible. The designer should avoid placing welds so close together that the heat from one will affect an adjacent one. The designer should specify the base material and the filler rod, as well as testing procedure.—Journal of the A. W. S., January.

MILBURN CUTTING AND WELDING TORCHES—New torch section just prepared for the general catalog of the Alexander Milburn Company. A full line of oxy-acetylene torches, including a combination welding and cutting torch, is described and illustrated.

A. E. F. WELDING ILLUSTRATED—Monthly bulletin of the American Electric Fusion Corporation, Chicago. The November issue features an article describing the use of the auto-transformer in securing voltage variation in the welder. Another article tells how a manufacturer improved the quality of his product and saved two-thirds of his former assembly cost by substituting spot welding for riveting.

WELDS ALUMINUM BY TWO METHODS, by D. H. Miller—Technique for the flux system and the puddle system of welding aluminum castings.—Foundry, February 1.

TESTS OF WELDED JOINTS—Description of design of test pieces and methods of testing—Buildings, January.

THE WELDING AND CUTTING TORCH IN THE POWER PLANT, by L. A. Cowles—A list of miscellaneous jobs performed in a power plant, showing the wide field of usefulness for the torch.—Power, January 26.

SHOP AND EMPLOYMENT TESTS FOR QUALIFIED WELDERS, by G. O. Carter—A proper test will make sure that the welder is capable of depositing metal of the desired strength. Small test pieces bent over an anvil or in a vise usually prove an effective method of testing.—Railway Mechanical Engineer, January.

WELDING AS APPLIED TO TRACK MAINTENANCE, by C. J. Burgundthal—Methods involved in building up worn surfaces of rails, frogs and switches.—Railway Review, January 23.

CUTTING WITH OXY-ACETYLENE IN A STEEL FOUNDRY, by R. W. Thomas—Greater freedom in design of steel castings has been secured by the application of the cutting process. In addition, many production problems have been solved.—Foundry, January 15.

IMPROVED WELDING EQUIPMENT A HELP TO SCRAP REDUCTION, by J. L. Feemster—How one railroad had organized its welding department so as to get the greatest possible benefit from the welding and cutting processes. An innovation is the installation of a cutting house next to the blacksmith shop to provide a method of cutting heavy billets and forgings into the heavy forgings used on locomotives.—Railway Purchases and Stores, January.

Classified Ads

Help Wanted—75c per line, minimum 4 lines.
Jobs Wanted—4 lines free.
Other Ads—$1.00 per line, minimum 4 lines.
Counted 8 words to line. Add 6 words for keyed address.

Wanted—Thoroughly experienced welder who is capable of giving advisory service on welding jobs, demonstrating bare and coated electrodes and servicing arc welders. One who is familiar with both gas and electric welding preferred. Must have had wide experience in different metals and different jobs. Address 83, care the Welding Engineer.

Stulz-Sickles Company, Newark, N. J., has several openings for thoroughly qualified salesmen, to represent them selling SEACO GAS and ELECTRIC WELDING RODS. Exclusive sales rights to be had in several territories. Give qualifications when writing for our proposition.

For Sale—One 600 ampere 3 to 4 operators contact potential C. & C. Welder with direct current 220 volt circuit connected drive. Can be seen in operation at The Vilter Mfg. Co., 935 117 Clinton St., Milwaukee, Wis.

Service Rights for Sale—On a number of Prestolite Wk. Cylinders. Apply P. O. Box 1075, New Orleans, La.

For Sale—Service rights on 8 WK type Prest-o-Lite Acetylene cylinders at a reasonable figure. Address Yellow Cab Co., Pittsburgh, Pa.

For Sale—Completely equipped welding shop in thriving Pacific Coast sawmill town, $3,000.00 cash. Address 82 care The Welding Engineer.

Manufacturers—Of electric or acetylene welding apparatus let me represent you in Philadelphia, Lesgi Centennial Year. Write E. J. M., 2314 E. Mercer St., Philadelphia.

Position Wanted—By welder with seven years experience, acetylene. Graduate Northern Polytechnic Institute, London, England. Former U. S. Army Instructor, American. Address Welder, 117 E. Second St., Madison, Ind.

Position Wanted—American, 23 years old, High School grad., two years experience acetylene welding in salvage work and on automobile bodies, wants permanent connection. Address Paul Mahon, 1008 Galewood Drive, Cleveland, Ohio.

Position Wanted—Experienced oxy-acetylene and electric arc welder wants a job. Will go anywhere. Can furnish the best of references. Address Valentine W. Andrews, 108 Grand Avenue, Medford, Mass.

WE HAVE AN OPENING for a man who has had successful selling experience in the oxy-acetylene welding industry or the oxygen industry. We have no pre-conceived ideas as to age, but think we prefer a man around thirty and that he be single (because the position will require traveling). He need or need not be a university graduate, but he must have a pleasing personality, the ability to think logically, and be anxious to work hard. We are willing to start such a man at $4,000.00, and perhaps more. Write giving us all the information you think we should have to judge whether an interview is desirable. Your communication will be held in the strictest confidence. Address O. A., care The Welding Engineer.

REBUILT WELDERS

We buy, sell, rent, exchange and repair
ARC WELDERS AND SPOT WELDERS.
Every machine tested in actual welding service and guaranteed

GOODMAN ELECTRIC MACHINERY CO.
126 Green Street Newark, N. J..

ARC WELDER DISTRIBUTORS WANTED

We desire distributors to sell and supervise the sale of USL electric arc welding equipment. Unusual money making opportunity for men who are qualified and familiar with arc welding and its applications. A worthwhile connection. Further particulars upon request. Write Department M.

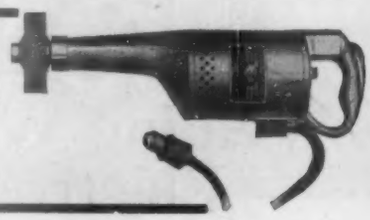
U. S. LIGHT & HEAT CORPORATION
Niagara Falls, N. Y.

For Sale—The best equipped Job Welding Plant in New England, located in Bridgeport, Conn. Building 40x100 feet, constructed of brick and concrete. Steam heat. Equipment consists of Electric and Acetylene Welding Machines, Acetylene Generators, Preheaters, etc. Established in Bridgeport 12 years. Large clientele. For further information write Cave Welding & Mfg. Co., 455 Worthington St., Springfield, Mass.

First and Last in Good Welding—a WODACK

A WODACK Portable Electric Grinder gets the job ready for the welder. It's the quickest and neatest way to clean and bevel the metal. After welding, smooth it up in a jiffy, for any kind of finish. Real welders tell us that this tool pays for itself. Let us tell you more about it.
Our booklet, "Electric Tool Facts," tells more about it. Send for your copy.

Wodack Electric Tool Corporation
43 S. JEFFERSON ST. CHICAGO, ILL.



"PROCESSED"

The cost sheets *tell the tale!*

Users who have standardized on Page-Armco and Steel "Processed" Welding Wire and Electrodes find their cost sheets showing a pleasing reduction in the cost of handling particular types of work.

This is due to the exclusive Page method of "Processing" all wire and electrodes to meet the exact requirements of the class of work to which they will be subjected. In addition, all specifications of the American Welding Society are strictly conformed to.

Regardless of the job, you will find a correct grade of Page "Processed" Wire, or Electrode, to do it more efficiently and economically—to save your welders' time and eliminate spoiled work.

Page Mild Steel Gas Welding Wire and Electrodes, Page-Armco Wire and Electrodes and Page High Carbon Wire and Electrodes are rapidly replacing ordinary market wire. Place them to the most severe tests and watch your cost sheets show a real saving. Let us prove this to you. Write today for interesting literature and samples. No obligation.

PAGE STEEL & WIRE COMPANY

An Associate Company of the American Chain Co. Inc.

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District Sales Offices: Chicago, New York, Pittsburgh, San Francisco

PAGE-ARMCO PROCESSED

Welding Wire *and* Electrodes

Uniform Quality Assured

WELDERS who use Commercial Acetylene soon learn that every cylinder contains the same pure gas.

Your torch can tell the difference!

COMMERCIAL ACETYLENE
Means pure acetylene.

COMMERCIAL SERVICE
Means prompt service.

No matter what your gas requirements may be you will be interested in our sales plan. Ask our nearest office to tell you about it.

Supplied in the following size cylinders:

10x30-in. size	125 cu. ft. cap.
12x36-in. size	225 cu. ft. cap.
12x44-in. size	275 cu. ft. cap.

Commercial Acetylene Supply Company, Inc.

General Office: 80 Broadway
New York City

BRANCHES:

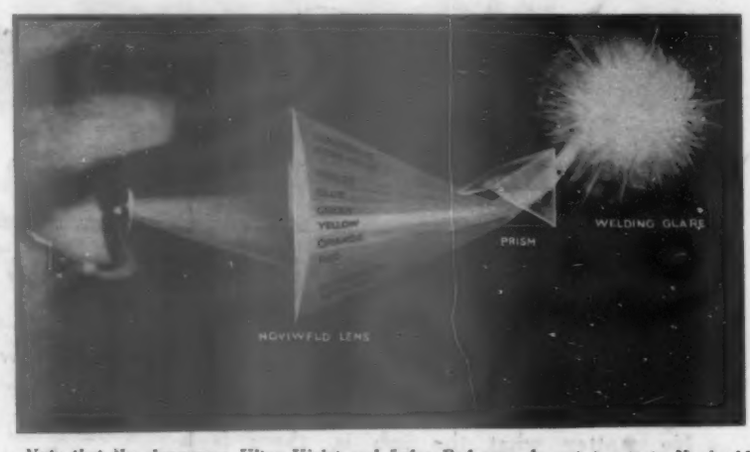
80 E. Jackson Blvd.
Chicago, Ill.

613 Trust Co. of Georgia Bldg.
Atlanta, Ga.

683 Atlantic Ave.
Boston, Mass.

417 Market Street
San Francisco, Calif.

Wellsworth
Noviweld Lenses
Protect Welders from injurious light



Note that the dangerous Ultra Violet and Infra Red rays do not penetrate Noviweld Lenses.

Noviweld lenses in Wellsworth Welding Goggles absorb 99-9/10% of the dangerous Ultra-Violet and 97% of the injurious Infra-Red rays. They are guaranteed by the Wellsworth Scientific Laboratories to have these protective qualities.

The color of a lens does not indicate its protective qualities. Be sure you know goggles actually protect before they are allowed in your plant.

American Optical Company
Factories at Southbridge, Mass.

WELLSWORTH SAFETY GOGGLES

NEW YORK, 70 West 40th St. · SAN FRANCISCO · CHICAGO, 10 So. Wabash Ave.
ST. LOUIS · KANSAS CITY · ATLANTA

WELLSWORTH SAFETY GOGGLES

SWEDOX

WELDING RODS, WIRES and ELECTRODES

SEND FOR TESTING SAMPLE

We want every welder in the country—big or small—to be convinced of the ***specialized superiorities*** of SWEDOX products. We know that a trial ***will*** convince you. Hence the free offer. Try SWEDOX on your next welding job at our expense.

No matter what the job is, there is a SWEDOX product especially made for it. We sought and obtained from the nation's expert metallurgists and welding engineers the best analysis for each task. Science has put into SWEDOX rods and wire the proven betterments that make them the recognized standards in every case.

You'll find SWEDOX products free from impurities, uniform in analysis and therefore economical because their use reduces the cost of application and of machining.

We'll send you a sample, at our expense, enough for a thorough test—one which should prove to you, as thousands of welders know, that SWEDOX products are the standards.

SWEDOX booklet describing the products and their uses in detail, will gladly be sent upon request. Address department 4.

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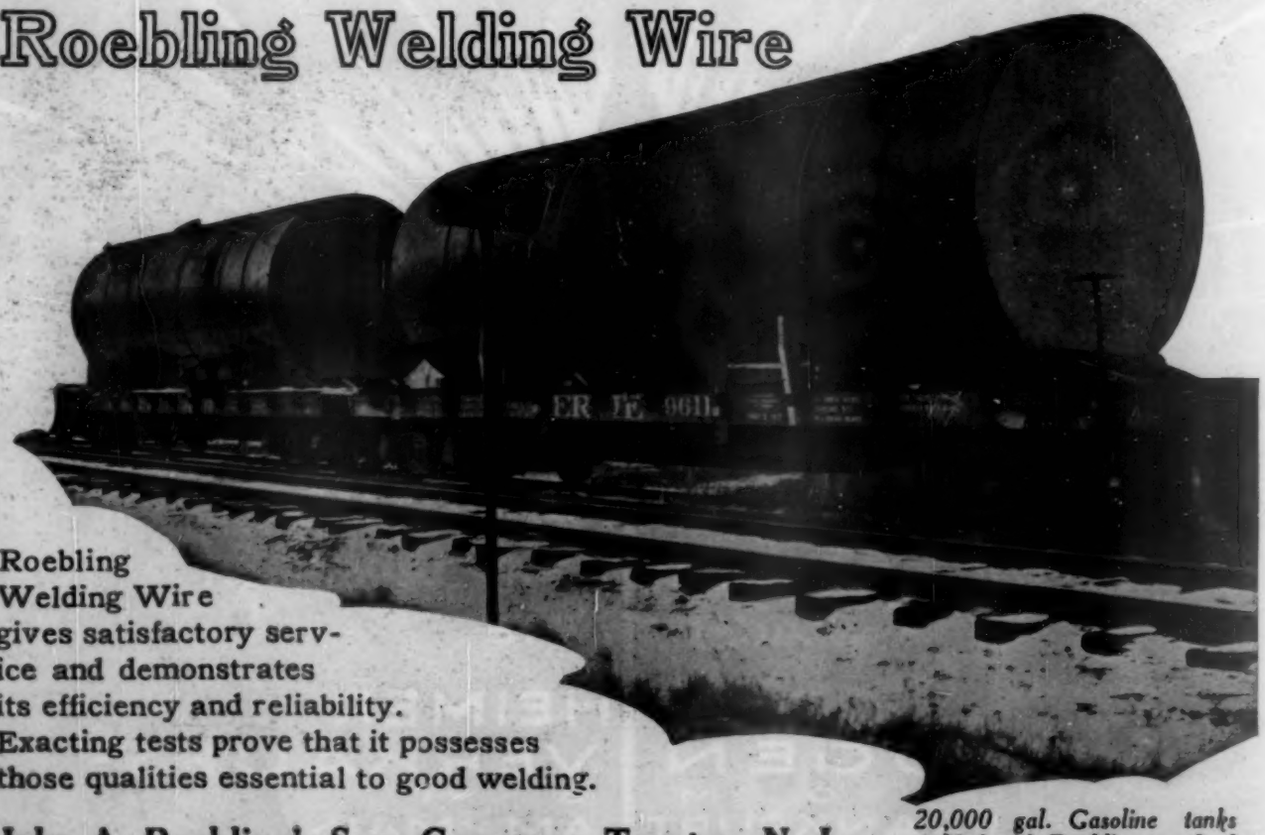
4545 S. Western Blvd.
Lafayette 8500

Central Steel & Wire Company

DETROIT, MICH.
5001 Bellevue Ave.
Lincoln 6750

Roebling Welding Wire



Roebling
Welding Wire
gives satisfactory service and demonstrates
its efficiency and reliability.
Exacting tests prove that it possesses
those qualities essential to good welding.

John A. Roebling's Sons Company, Trenton, N. J.

20,000 gal. Gasoline tanks welded with Roebling standard bright electric welding wire.

"WELDMACO" MANGANESE WELDING ELECTRODES

Has your experience in Manganese Welding been of the hit and miss variety? After hours of painstaking work with sputtering arc have your raised your hood with a sigh and said "well done?" Or have you guessed that the job was "well done" when you knew that the big possibility was there that you may have been merely burning up high priced steel? Would relief from this guess-work be worth investigating?

There IS something new under the sun—"WELDMACO"—and it makes a deposit of 12% to 13% Manganese, free of Blow-Holes, Craters and Cracks. It flows as easily as a low carbon rod and gives deep penetration without damage to the steel structure of the work-piece.

The Price? 35c Per Pound at New Orleans.

WELDING MATERIALS COMPANY

1113 NEW ORLEANS BANK BLDG., NEW ORLEANS

Manufacturers of Manganese Welding Electrodes ONLY

A Good Proposition Open for Dealers Everywhere

THE largest manufacturer of oxy-acetylene welding and cutting apparatus in Europe is desirous of forming an American connection to market his product.

The apparatus is quite well known in the United States, is of the low pressure or injector type, but will, of course, operate on pressure generators or dissolved acetylene. The entire equipment is properly designed and well manufactured. It offers some striking points of superiority over any other injector apparatus. Torches are absolutely free from flashbacks, even when operating on ten inches acetylene pressure. Regulators are so constructed that they will not freeze even when extremely large volumes of gases are passing through them.

It is the desire of this European manufacturer to organize an American corporation, in which he will purchase a liberal amount of the stock.

Here is, we believe, a first-class opportunity for someone who is thoroughly familiar with the oxy-acetylene industry and has sufficient funds to insure his active interest to become connected with a money-making proposition.

This advertisement is not written with a view of securing capital. It is meant to secure the proper man. Address 84, care The Welding Engineer.

OXECO ACETYLENE CYLINDERS

Acetylene users who purchase acetylene in seamless monolithic filled cylinders are getting the best that the industry can offer.

Acetylene compressing companies using such cylinders are doing business with the idea that merely "good enough" is not sufficient. These companies have paid a premium in order that their customers may have the BEST cylinders obtainable; cylinders that have a safety and service record of 100%.

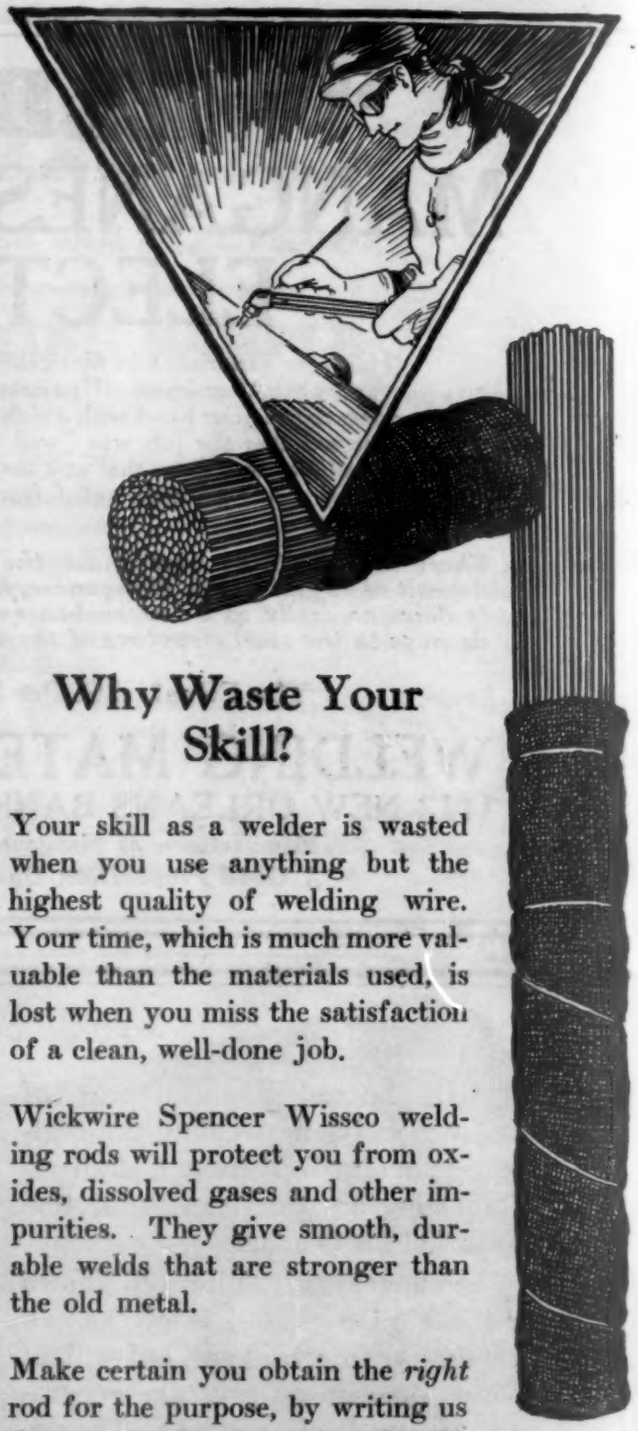
Such cylinders are invariably filled in a strictly modern plant, where no expense has been spared in order to insure the fact that only the highest quality acetylene is produced.

Specify "delivered in seamless monolithic filled cylinders" on your acetylene purchase orders.

KEITH DUNHAM COMPANY

110 South Dearborn Street

CHICAGO, ILL.



Why Waste Your Skill?

Your skill as a welder is wasted when you use anything but the highest quality of welding wire. Your time, which is much more valuable than the materials used, is lost when you miss the satisfaction of a clean, well-done job.

Wickwire Spencer Wissco welding rods will protect you from oxides, dissolved gases and other impurities. They give smooth, durable welds that are stronger than the old metal.

Make certain you obtain the *right* rod for the purpose, by writing us for our circular describing the different grades and their uses.

Wickwire Spencer Steel Co.
41 East Forty-second Street
New York

WICKWIRE SPENCER STEEL CO.

WICKWIRE SPENCER PRODUCTS

"RACO" WELDING WIRES

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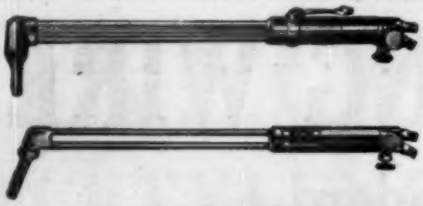

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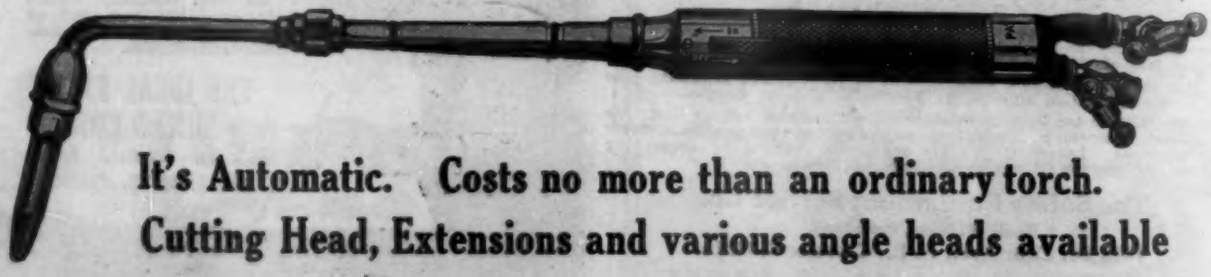

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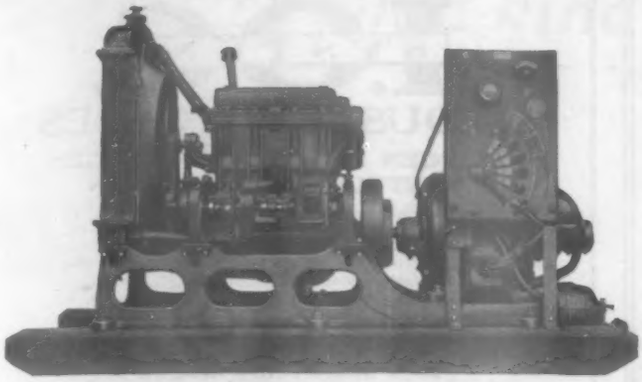

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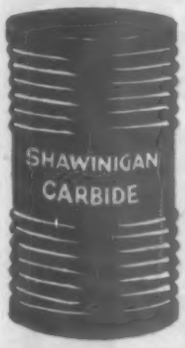

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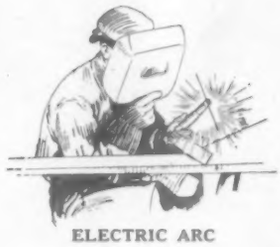

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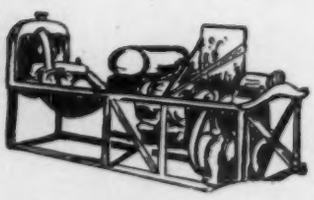

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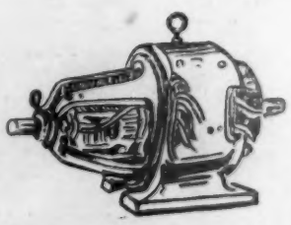

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